amateur radio

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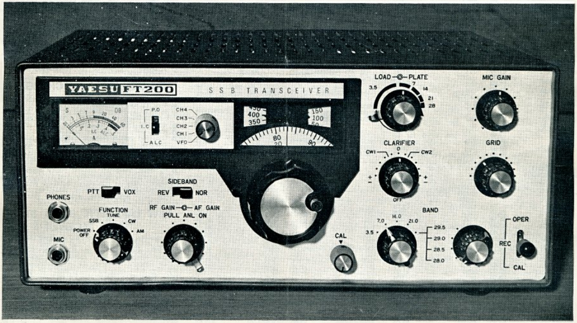

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12AX7 (ECL83)	$1.60
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12J5	50c
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amateur radio

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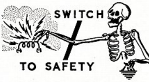
COVER STORY

Our cover picture this month shows the Yaesu FT-200 s.s.b. transceiver, details of which are presented by Bail Electronic Services on page 5. Technical data is given on page 24.



SWITCH
TO SAFETY

FEDERAL COMMENT

The 43rd Conference of the New Zealand Association of Radio Transmitters was held this year at Gisborne, over the New Zealand Queen's Birthday week-end, 30th May to 1st June.

The then President of N.Z.A.R.T., Harry Burton, ZL2APC, invited the Federal President of the W.I.A. to attend this Conference at the conclusion of the I.A.R.U. Region III. Congress held in Sydney at Easter 1968. By a decision of the Federal Council at Easter 1969 this invitation was formally accepted, and so it was my privilege to represent the W.I.A. at this Cook Bi-Centenary year Conference.

This "Federal Comment" is being written whilst I am still in New Zealand, and whilst perhaps many of my impressions are still jumbled.

Amongst my outstanding impressions are the warmth and hospitality of the New Zealanders, the fact that 300 people sat down to the Conference Dinner on Saturday night (a dinner which boasted of what must surely have been one of the longest toast lists of any dinner) and that many of those who attended drove for more than eight hours to get there over roads far worse than many in Australia.

I realise now how little I knew about N.Z.A.R.T. It is very different in terms of organisation from the W.I.A.

It is made up of "Branches", 64 in all, each serving a relatively small area. Each Branch may send a delegate to the Conference. Prior to the Conference, the formal motions (remits) are published and considered by the Branch. Then the delegate exercises a vote (either with or without a discretion to use his own judgment) that is proportional to majority for and against the motion at remit night, expressed as a proportion of the total voting membership of the Branch.

For example, if there are 100 members of a Branch, and on "remit night" 25 turn up, and 20 are in favour of a particular motion, the delegate from that Branch exercises 80 votes in favour of the motion—it all seemed a little confusing at first.

Individual members may attend at Conference, speak, and, if they have given prior notice to their Branch delegate, exercise a vote.

N.Z.A.R.T. is governed by a Council between Conferences, consisting of a number of Councillors elected from each Call District. Presided over by the President (who is elected by all the members), the Council meets in person once a year at Conference time. Otherwise its meetings are conducted over the air on 80 metres, on the basis of circulars sent out by the President.

I was invited to attend the Council meeting and was able to discuss with the Councillors a number of matters of a common interest. Agreement has been reached on the mutual exchange of publications. "Break-in" maintains a high standard, and will probably be of interest to many Australians. Soon I expect that an announcement will be made as to how members will be able to obtain their subscription through the W.I.A. In addition, some samples will be distributed for those who have not seen this publication.

So far as Region III. is concerned, I have had some very valuable discussions, both with Tom Clarkson, ZL2AZ, the N.Z.A.R.T. Director, and with Harry Burton, ZL2APC, the Assistant Director. I now understand N.Z. A.R.T. views much better in a number of respects.

I have found that most New Zealand Amateurs know very little about the W.I.A., but are very interested to learn more. Few have seen "A.R."

As a Federal system is so foreign to them, they found our organisation a little hard to understand at first.

High praise was given to W.I.A. Contest Manager, Neil Penfold by a number. Some concern was expressed at the slight delays in some W.I.A. correspondence, though this related not to the present time.

These then are a few of my first impressions. No doubt we in the W.I.A. can continue to live without N.Z.A.R.T., as they can live without us, however there is every reason for our two Societies to work together. The New Zealand influence on the Region III. organisation can be considerable. It is a large Society with sophisticated views. We can learn much from them, and together, within the framework of the I.A.R.U. organisation, we can achieve more than we can alone.

Michael J. Owen, VK3KI,
Federal President, W.I.A.

CONVERTING THE AR88 FOR S.S.B.

G. A. VAN DER HARST, VK5XV*

Many AR88s are still in use by Amateurs and S.w.l's throughout Australia. This is not surprising as it is a first class general coverage receiver. It still does quite a reasonable job for the Amateur as a main receiver too. However, it is a pity that for s.s.b. copy it means manipulating the r.f. gain control and even then there is still some distortion. It must be possible to switch from a.m. to s.s.b. without any re-adjustment of the r.f. gain control. This has been done and although it might take you a few evenings to do it, it is well worth while. So here we go.

The following steps have to be taken:

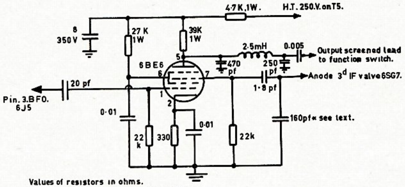
(a) A product detector has to be added.

(b) A different wafer has to be mounted on the "Off-Trans.-Rec. Mod.-Rec. CW" switch.

(c) A 1-pole 2-position switch has to be mounted on the front panel to switch a.g.c. constants (adjustable decay time).

THE PRODUCT DETECTOR

The product detector circuit in Fig. 1 is a conventional one. It is a very easy one to get going, not only in the AR88, but in any receiver. Here is what you have to do.



Values of resistors in ohms.
Values of condensor in uf unless stated.

FIG.1. PRODUCT DETECTOR.

1. Remove the condenser block which consists of C79, C84 and C92, each of 0.1 uF. Replace these with Polyester pigtail type of 0.1 uF., 400v.

2. Drill a hole for the 6BE6 valve base right behind T10 (b.f.o. transformer), this being the spot where the block condenser was in the first place.

Making this hole is not an easy matter. The thing to do is, get a screw punch for a 7-pin valve base. Mark the spot with a punch where the centre is going to be and make a circle with a compass, the diameter being that of the valve base. Drill the centre hole. Then drill smaller holes right around on the inside of the circle diameter. Insert the screw punch and you will find that it will just do the job, making a clean hole.

Just putting the screw punch in without all the holes around the circle will not do it as the chassis steel is quite a heavy gauge.

Drill holes for the mounting screws in such a way that pin 1 will be facing the b.f.o. valve base. Mount valve base.

3. Wire the product detector as per diagram in Fig. 1. H.t. is taken from the mounting lug of T5 (junction h.t. and 1K resistor). Filament is taken from V9.

The value of the condenser marked * has to be adjusted so that switching from a.m. to s.s.b. gives the same output. The value should be close to that given in the circuit diagram.

A few tag-strips were used to mount the associate components. Do not connect the output lead of the product detector yet.

THE WAFER

A different wafer has to be mounted on the function switch as the present one has not enough contacts. The wafer used is a three-pole, four-position wafer which has two poles on one side and one pole on the other side. This may be a bit hard to get, but no difficulty was found after searching a bit in surplus stores.

The contacts on the back of the receiver (term. 3 and 4) for relay switching purposes are made inoperative in this case. However, if you can find a single wafer with four poles four positions, you can leave them on.

The following has to be done:

1. Remove the function switch and unsolder the leads, but remember where they are going to. This is easy as all leads have a different colour.

2. Cut the two green leads which go to term. 3 and 4 on the back of the receiver at the switch end. Put some insulating tape on them and tuck them away under the loom.

3. Dismantle the function switch. Remove the wafer. Transfer the spacers so that the longer ones are in front and the shorter ones are at the back of the new wafer. Mount the wafer so that the two poles are at the back and the remaining pole on the front.

4. Remove the lead of the condenser which goes to the centre contact of the a.f. gain control and solder this to a one-lug tag-strip which can be mounted near the a.f. gain control. Then solder a shielded wire from that tag-strip to the new wafer.

Now solder the rest of the leads as per diagram in Fig. 2, including the shielded wires from the output of the product detector and the one going to the a.f. gain control.

5. Mount the function switch back in position.

THE A.G.C. SWITCH

Having gone this far, one will find that s.s.b. copy is excellent except that on very strong signals the a.g.c. is "pumping" quite a bit due to the relative fast decay time. This can be cleared up by making the decay time adjustable, i.e. by adding a 1 uF. condenser to the a.g.c. line. Proceed as follows:

1. Drill a 3/8 inch hole in the front panel, straight above the selectivity switch and at the same height as the b.f.o. adj. knob.

2. Insert a one-pole, two-position switch.

(Continued on Page 24)

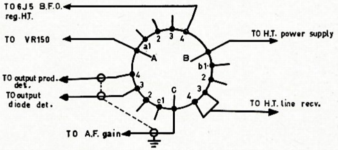


FIG.2. MODIFIED FUNCTION SWITCH.

* 21 Dudley Crescent, Marino, S.A., 5049.

*Making Cabinets for Home-Built Gear**

PRACTICAL METAL-WORK FOR THE CONSTRUCTOR— FABRICATION, FINISH AND SPRAY-PAINTING FOR THAT PROFESSIONAL APPEARANCE

J. E. AUSTIN, G3REM

MANY Amateurs spend a great deal of time on the chassis layout and wiring of their home-built equipment, but are rather stuck when it comes to finding a suitable cabinet into which the completed unit can be fitted. In some cases the unit remains as an open chassis, and in others a surplus cabinet is purchased. An open chassis is unsightly, can be dangerous and is an efficient collector of dust. Finding a surplus cabinet of the correct dimensions is not always easy and all too often one ends up with something which is larger than necessary, displays unwanted holes and possibly some damage.

The writer has a professional interest in sheet metal work and feels he could suggest an improvement in the **outside** appearance of home-built gear. The ever-present problem of t.v.i. anyway demands adequate screening of transmitting equipment and a snugly fitting cabinet can be a great help in this respect. The cabinet described was made at home and houses a 2/TT21 linear amplifier.

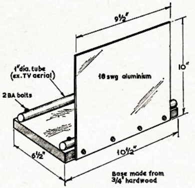


Fig. 1.—Bending jig.

Tools used are unsophisticated but good results can be obtained. In order to save the reader a lot of reading and the writer a lot of writing, the accompanying drawings are self-explanatory as far as possible.

For hand working, the most convenient gauge of aluminium sheet is 18 gauge, and this is used for the cabinet sides and bottom cover. The lid and front and rear panels are made from 16 gauge, cut with a metal cutting blade similar to the well known "key hole" saw. The appearance of any station can be greatly enhanced if all the cabinets are matched and in the present example that of the Sphinx Tx was adopted.

A start was made by constructing a simple jig on which to shape the two side panels (see Fig. 1). The base board was cut, planed and squared to the exact height of the panels and some 2 in. longer. The one-inch tube was then bolted on level with the edge of the board, with one bolt at each end. Next, cut the aluminium sheet to the exact length required but allow about 3 inches in the height for primary fixing and bending losses. Drill the sheet near the edge and screw to the jig, as shown. Now pull the sheet down over the first form and secure in a carpenter's vice, clamping it down on top of the tubes. Next, pull the sheet round the second form. Make the other side panel in the same way, then trim off the drilled edges (Any "spring back" effect can be corrected after removal from the jig.)

Eight angle pieces are required next and these were made in a folding iron designed by the writer and made by the local blacksmith (see Fig. 2). Use 16 gauge aluminium sheet and bend over with a piece of smooth hardwood, tapping with a heavy hammer.

The front and rear side pieces can now be rounded at the ends to fit inside the side panels (see Fig. 3). As the front panel is to be set back 3/8 in. the front angle pieces must go in by that amount **plus** the thickness of the front panel, say a total of 7/16 in. The rear side angle pieces are set in by the thickness of the rear panel so it fits flush to the rear edge of the cabinet. Use a scrap piece of 16 gauge as a gauge.

Where the fitting of any part is known to be permanent, it is good practice to use rivets. They are quick, neat and easier than small nuts and bolts. Countersunk 1/8 in. ali. rivets are used to secure the angle pieces to the side panels. Where quick access may be required anchor nuts are rivetted in to save fiddling with small nuts and bolts in odd corners (we've all had some of that!). Anchor nuts are fitted to the angle pieces for later assembly

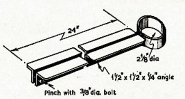


Fig. 2.—Bending irons.

work. The other four angle pieces can now be trimmed to size and the anchor nuts fitted as shown (see Fig. 4).

Strips of 16 gauge are next rivetted on to the bottom edges of the side panels to take the bottom cover. The cabinet can now be assembled and squared up, using short screws where the feet are to be put on later (see Fig. 5). Now cut out the front and rear panels and file to a good fit for the cabinet.

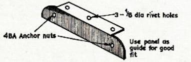


Fig. 3.—Side angle pieces—four off.

After drilling, the panels can be worked into place, using chromed mushroom head screws on the front panel and round head on the back. The lid also is cut from 16 gauge ali. and dimensioned to cover cabinet assembly screws on the top. Rivet a strip of 18 gauge to the front to complete the "frame" to the side panels (see Fig. 6). Holes for vent grilles can be punched out if required. Slot in a length of piano hinge as shown and fit the lid into place, using countersunk BA screws. A strip of 16 gauge goes over the rear web of the hinge to level it with the lid. Mark the position of the lid fixing screw and drill the hole for it; the screw can be made captive by tapping the hole 4BA and then filing off a few threads below the head of the screw.

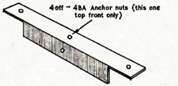


Fig. 4.—Top and bottom angle pieces—four off.

The bottom cover is cut from 18 gauge and held in place by small self-tapping screws. Vent grilles can also be pierced in the bottom if necessary. The feet are made from brass bar and rubber buffers, secured by long 4BA screws into the corner anchor nuts.

The cabinet is now complete and if any service work is necessary at a later date a side panel can be removed very quickly. In fact, the whole cabinet can be dismantled in a matter of minutes.

* Reprinted from "The Short Wave Magazine," March, 1969.

Anchor nuts can be purchased at good D-I-Y shops and they are rivetted into place like countersunk rivets. (An old ball bearing is very useful for starting off the rivetting action.) If the side of a hole breaks away when fitting an anchor nut, make a new angle piece twice the required width and trim off surplus metal after the nut is in place. Piano hinge can also be purchased at D-I-Y shops, in standard lengths and several different finishes, including chrome.

The completed cabinet can be spray-painted to match the colour of other units in the shack. Small pressure cans of quick drying paint are ideal for this purpose. A surprisingly good finish can be obtained.

PAINTING THE WORK

There is no doubt that a nicely painted item of equipment looks vastly superior to one which is left unpainted. Since the advent of the pressurised can a whole new vista of possibilities has presented itself to the home constructor. Though these pressurised cans of paint or cellulose can give a finish of professional standards, some practice is necessary. It may not be generally understood that the quality of any paint finish is determined by the efficiency of the preparation work rather than by the application of the final colours, as any competent home decorator knows!

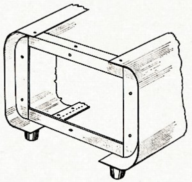


Fig. 5.—Diagram showing angle pieces in position and feet.

Cellulose and other quick drying materials tend to settle for some time after application, thus any mark in the metal or undercoats will show through the final colour. For this reason, the surface to be painted should be free from marks, scratches, etc., before the final colour coats are applied.

Choice of colour can be determined by that of the central item of equipment in the shack, such as the Rx or Tx. The appearance of the station will be much enhanced if the gear is all matched in colour.

The range of colours on sale for touching up work on cars is very wide and one can be sure of obtaining a repeat at a later date. As there is a tendency for a general range of colours to appear in cycles, it should be possible to obtain a close match to the desired pattern colour.

Aluminium is the most widely used material for radio constructional work and also presents special problems with regard to a paint finish. Aluminium oxidises very rapidly and it is for this reason that paint does not adhere too well.

Special primers are made for aluminium and these are known as "etching primers". As the name implies, this type of primer tends to eat into the metal, thus getting through the surface oxides and adhering more firmly. The writer has not up to now found any etching primer for aluminium available in the popular cans, but is ever hopeful. In the meantime, the method outlined below has been adopted.

PREPARATION

Prepare the surface by rubbing over with fine steel-wool until the top shine has been removed—get down to the "dull". Now clean off any dust and blow out the odd corners, finally treating with a de-greasing agent if necessary.

Next, spray on a thin coat of **metal** primer or primer/filler and allow to dry thoroughly. When dry, spray on at least three further coats. If rivet or screw heads are present give each one a separate local coat of paint before spraying the complete surface, and do the same to sharp edges. (This is to reinforce the paint thickness against later rubbing down operations, as these points will be sensitive to rubbing paper.)

The paint should now be left to dry and harden right off, preferably overnight. When hard, rub lightly with fine "wet or dry" rubbing paper, using plenty of water. The idea is to level off any surface dust or pigment. Take care not to break through the paint surface at any point, or the colour may sag or run later on. If the aluminium was unmarked at the start of the job it should now look smooth and level.

RUBBING OUT SCRATCHES

However, if there were some scratches in the metal proceed as follows:

Before rubbing, spray on a dust coat of contrasting colour, say, black on grey primer. The primer should just be speckled in black and not covered completely. The black will fall into any scratch marks and these will show up as rubbing proceeds. Rub until all the black guide coat has gone from view, proving that the surface is now level. Do not rub a scratch mark **locally**, but over the general area surrounding, otherwise a depression larger than the scratch will result! Deep scratches will require filling with knifing stopper, which must be left overnight to harden. To level the stopper, dust with black, then wrap a piece of rubbing paper round a flat wood block and rub until level. Spray two coats of filler over any stopper to seal it. When dry, rub lightly to remove spraying dust around the area. Use a black guide coat if necessary.

Having made sure the undercoats are hard, clean and free from dust, prepare to spray the final colours. Choose a warm, dry location which is free from draughts and lightly sprinkle water over the floor (if it is likely to be dusty).

Spray on three or four coats of colour, reinforcing over screw heads and edges as before. When dry and hard (overnight), inspect for quality of finish. If the colour is smooth and shiny it may now be cut down to a fine finish with metal polish and then wax polished.

FINISHING

If, however, the well known "orange peel" effect is in evidence, take a piece of very fine rubbing paper (500-grade or finer) then fold in half and rub against itself to dull the sharpest grits. Wet the paper, then rub soap into it to prevent clogging as rubbing proceeds. Rinse and re-soap frequently, rubbing until the colour has a matt appearance all over. The shiny colour will act as a guide against the matt rubbed sections. When clean and dry, spray on a final coat of colour. After cutting down with metal polish and waxing, the finish should be of a high standard.

Wax polish is chosen because some types of liquid polish contain silicones and these would react unfavourably with the paint during any later touching-up operations. The writer is also of the opinion that good wax polish produces a superior, lasting finish to that produced by the so-called "quick," "all in one," "shines itself" type of polish.

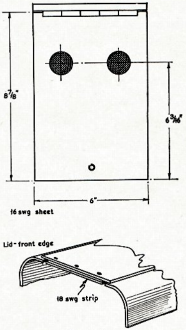


Fig. 6.—Lid.

NOTES ON PAINT SPRAYING

Colours are usually given a name and a reference number, which is printed on the can. They are obtainable from any good garage or service station.

The thickness of the material may vary from can to can and it is advisable to spray a test piece with each can before use to see how it goes. If the paint is thin, spray on one or two extra coats. Thicker paints should be sprayed on as wet as possible and then be left to settle for **up to two days.**

(Continued on Page 11)

VK3 V.H.F. GROUP V.H.F. PRE-AMPLIFIER

BY THE PROJECT COMMITTEE OF THE VK3 V.H.F. GROUP

In keeping with the function of the Project Committee of the VK3 V.h.f. Group, that is to develop "state of the art" projects for v.h.f. enthusiasts, a v.h.f. pre-amplifier has been developed. The pre-amplifier is suitable for use on either six or two metres.

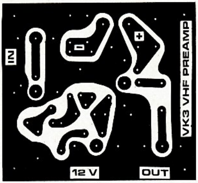
The design objectives for the pre-amplifier were:

(a) Best noise figure possible consistent with reasonable cost.

(b) Sufficient gain so that system noise figure is determined solely by the pre-amplifier.

DESIGN CONSIDERATIONS

Minimum noise figure dictates the use of bipolar transistors or field effect transistors (FETs) in the v.h.f. range. There is little to choose between FETs and bipolar transistors on the basis of noise figure, however other factors make FETs the logical choice. Low cross-modulation, lower susceptibility to "r.f.-burnout" and low cost are three of these factors.



In general, while the lowest possible noise figure is desirable at v.h.f., there is a limit to the minimum useful noise figure. In addition to noise due to thermal agitation in the radiation resistance of the antenna and the input stage of the receiver, external noise is received by the antenna.

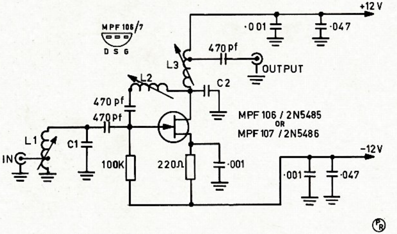
At v.h.f. external noise is made up of man-made electrical noise, atmospheric noise and cosmic noise. In quiet locations cosmic noise is the limiting factor. As the noise figure is lowered, noise introduced by the receiver becomes insignificant in relation to external noise, and further reducing the noise figure brings no real benefit. This minimum noise figure is 6-8 db. at 52 Mc. and 2-2.5 db. at 144 Mc.[1] An important exception occurs in the case of an exceptionally long or lossy transmission line between antenna and receiver in which case even the best "low noise" converter will be internal noise limited. Under these conditions only a mast-head pre-amplifier will ensure that reception is limited by external noise. More comprehensive discussions of noise may be found in References 2 and 3.

DESCRIPTION

The pre-amplifier uses an MPF106/2N5485 or MPF107/2N5486 JFET (Motorola) in neutralised common source configuration. Neutralisation is accomplished by adjustment of L2, which resonates with the drain to gate feedback capacitance to form a high impedance parallel tuned circuit at the operating frequency.

A supply of 6-15 volts is required. The design voltage is 12 volts, at which it draws approximately 4 mA. Positive and negative supply rails are d.c. isolated from earth, allowing operation with either polarity earth. The input and output impedances are 50 ohms although the mismatch of a 70 ohm termination is negligible. The pre-amplifier may be left on during transmission periods. This will prevent changes in junction temperature detuning the pre-amplifier at switch-on.

The pre-amplifier is constructed on a small (2" x 2¼") glass epoxy board. All capacitances below 1000 pF. are NPO disc ceramics. Above 1000 pF., Hi-K disc ceramics are used. Resistors up to ½ watt rating are suitable.



VK3 V.H.F. GROUP PREAMPLIFIER.

The coil formers used are Neosid Type A (single assembly) with F29 (v.h.f.) slugs. The bases usually provided have not been used, so as to maintain high unloaded tuned circuit Q. Instead, the boards are drilled 7/32" and the formers glued in. Coil details are given elsewhere.

PERFORMANCE

Noise figures better than 2 db. have been obtained on both 2 and 6 metres. Gain on two metres of typically 18 to 22 db. and slightly more on six metres.

APPLICATIONS

Use of the pre-amplifier will result in an improvement in noise figure over even the best valve type front ends, and most transistor and FET converters. In addition, the pre-amplifier may be employed to increase overall gain to a satisfactory level.

A great improvement will result when the pre-amplifier is used ahead of the front-end of "carphones".[4] Most "carphones" use a 6AK5 r.f. amplifier. The best noise figure that can be expected of this tube on 2 metres is 8 db., but a more likely figure is 11 db.[1] The improvement at 6 metres is less pronounced but nevertheless worthwhile.

A word of warning is necessary in connection with "carphones". Some "carphones" do not use an antenna change-over relay. Unless a change-over relay is installed the pre-amplifier will be damaged by excessive r.f. voltage. Installation of a change-over relay in these cases is recommended.

Similarly the change-over relays used in a few higher power "carphones"—mainly to 25w. 3/20 type—have inadequate isolation between contacts. Damage may be prevented by connection of back-to-back diodes from input socket to earth, on the copper side of the printed circuit board. Almost any small signal diode, such as the OA95, will be adequate. This addition results in only a slight decrease in performance.

CONSTRUCTION

The Neosid coil formers should be mounted first. File off the locating lands and glue the formers in place, making sure that the slugs will line up with the position of the cans. When the glue has hardened, the coils may be wound and the cans soldered in place, after which the remaining components may be mounted.

Ensure that all earth connections to the board are removed prior to solder-

ing in the FET. Although no special handling precautions are necessary, for best performances the FET should be pressed down to within 1/8" of the board. For soldering, a Scope soldering iron with clean pointed instrument tip is suitable.

COIL DETAILS

Two Metres

C1—3.3 pF.

C2—3.3 pF.

L1 (input coil)—22 gauge s.w.g. tinned copper wire, $5\frac{1}{4}$ turns tapped $\frac{3}{4}$ turn from cold end (cold end of coil being closest to board). Turns are spread slightly.

L2 (neutralising coil)—30 gauge B. & S. enamelled copper wire, 15 turns close wound.

L3 (output coil)—22 gauge s.w.g. tinned copper wire, $5\frac{1}{2}$ turns tapped $1\frac{3}{4}$ turns from cold end (cold end of coil being closest to board). Turns are spread slightly.

Six Metres

C1—10 pF.

C2—10 pF.

L1 (input coil)—26 gauge B. & S. enamelled copper wire, 10 turns tapped $2\frac{3}{4}$ turns from cold end (cold end of coil being closest to board). Turns are spread slightly.

L2 (neutralising coil)—30 gauge B. & S. enamelled copper wire, 38 turns single layer, close wound.

L3 (output coil)—26 gauge B. & S. enamelled copper wire, $11\frac{1}{2}$ turns tapped 3 turns from cold end (cold end of coil being closest to board). Turns are spread slightly.

ALIGNMENT

With the pre-amplifier mounted in its final position, connect the supply voltage. Peak L1 and L3 for maximum gain (or in a "carphone" maximum limiter current on a weak signal), adjusting the neutralising coil (L2) where necessary to restore stability.

A number of kits will be made available by the Disposals Committee of the W.I.A., Vic. Div. Only one type of kit will be assembled, each kit containing two superfluous capacitors for the band not required. Kits will include all components—board, resistors, capacitors, FET, wire, sockets, etc. The cost will be $5.40 including postage.

Enquiries should be addressed to:
"V.H.F. Pre-amp.,"
W.I.A., Vic. Div.,
P.O. Box 36,
East Melbourne, Vic., 3002.

REFERENCES

(1) Orr and Johnston: "V.H.F. Handbook."
(2) "The Real Meaning of Noise Figure," Kennedy. "Ham Radio," March 1969.
(3) "VK3 V.H.F. Group Two Metre Converter," "Amateur Radio," February 1969.
(4) Goodman: "Improved F.M. Operation," "Amateur Radio," April 1969.

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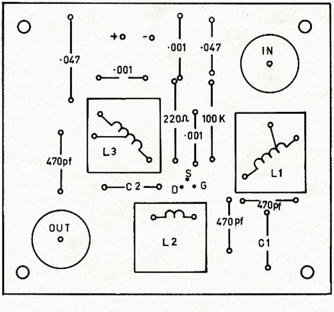

LAYOUT OF V.K.3 V.H.F. GROUP PREAMPLIFIER.

MAKING CABINETS

(Continued from Page 9)

Some paints will continue to settle for a week or two and the longer it is left before cutting down and polishing, the better the finish.

Do not spray in a cold, damp or humid atmosphere or the paint may "bloom". This effect is caused by absorption of moisture and black, for instance, will exhibit patches of whitish hue. (The only cure is to rub with fine paper and soap and spray over again!)

Where two colours are to be sprayed on to one panel, spray the lightest colour first. When dry and hard, mask carefully with sticky tape and brown paper, then spray on the other colour.

Inside surfaces should always be sprayed first and then masked up with paper. Stick tape on the inside of any screw holes before spraying the outside.

Where a co-ax. socket is to be fitted later, use an old socket as a mask, to leave a clean metal area of the correct shape on which to bond the final socket. Run a sharp knife carefully round the edge of the masking socket before removal. This will prevent peeling of the paint if it has bonded to the socket. Other fittings can be allowed for in the same way.

Small areas of knifing stopper will need rubbing level with 240-grade paper and a rusty steel chassis with 100-grade. Both are used with water.

Reds and maroons are difficult to get "solid" as they tend to be transparent, resulting in a streaky appearance. This can be overcome by giving the job a coat of black first.

Use light colours on battered items, because dents, etc., will show up less than if dark colours are used.

When spraying in a damaged patch, rub around the area for a few inches with fine paper, to bring the surrounding area of good paint to a matt finish. Bare metal should be primed and this can be done with a small pencil brush if the area is not great. Knifing stopper should be used if necessary to build up the paint level. Rub the stopper as before and seal with primer/filler. When dry, apply the guiding dust coat, then rub until smooth and clean, taking care to remove any dry spray dust around the area.

The surrounding colour should now have a matt finish, into the centre of which is merged the built-up area. When clean and dry spray in the colour. Give three coats, starting on the primer and moving outwards with each successive coat until the edge of the matt area is reached.

When dry and hard, cut down with metal polish until the new colour merges with the old. (If the new colour is a good match it will be difficult to detect the previously damaged area.)

Finally, remember that care and patience are necessary. Do not hurry the job. Allow plenty of drying time for each stage and do not be tempted into doing the lot in one fell swoop. The quality of finish obtainable is well worth any effort put into it.

FINDING TRUE RECEIVER SENSITIVITY*

The rated receiver sensitivity may be drastically changed when the receiver is used in an actual installation. How to determine the extent of this change by using a few simple charts is detailed in this article. Also, the area of how a preamplifier can improve receiver performance is explored in terms of preamplifier placement and required performance. If a receiving set-up is desired that will really be able to detect the "weak ones," the basics presented will tell you how to go about developing it.

JOHN J. SCHULTZ, W2EEY/1

If a transmitter has an output of 100 watts and is used with a matched transmission line having a 3 db. loss on a certain band, the power output at the termination of the transmission line will be 50 watts. The calculation is extremely simple using a power db. graph. If more power into the antenna is desired, one can either raise the transmitter output power or reduce the transmission line attenuation.

But, what about the receiving situation? How much is receiving sensitivity affected by the transmission line and other losses? Of what value might a preamplifier be and where should it be placed? These questions can all be answered once an analysis is made of a given receiving set-up. By a few simple calculations and using some of the original charts developed for this article, one can determine which is the best and least expensive method to improve the receiving side of a station set-up.

The material presented is applicable to all bands from 160 metres through u.h.f. Naturally, the reader has to use some judgment in determining how sensitive a receiving capability on a given band is useful. For instance, an ultra-sensitive capability on 160 metres may prove of little value since atmospheric noise will mask weak signals anyway. On u.h.f., on the other hand, increased sensitivity will often result in a direct increase in receiving range. Perhaps the best criteria to use in judging how far one can go in improving receiving sensitivity is to compare the set-up with the best that can be found in a given locality and under generally similar antenna locations.

NOISE FIGURE AND SENSIVITITY

The terms **sensitivity** and **noise figure** are used constantly in the article. One should have a good understanding of their meaning. Sensitivity is a combined measurement of the noise quality and amplification of a receiver. A stated sensitivity **only** has meaning when **both** the output signal-to-noise ratio and bandwidth are stated. Noise figure is purely a measure of the noise producing quality of an amplifier as compared to a theoretically noiseless unit.

Most good quality commercial receivers clearly state the conditions under which the sensitivity is measured. Some lower priced equipments simply state "sensitivity of 2 microvolts". Such information is useless and one must try to learn from the manufacturer the rest of the details under which the sensitivity was measured before judging how the receiver can best be improved.

By means of examples, the following paragraphs show how various receiving set-ups can be analysed. The method used is applicable, however, to any situation with different values of receiver sensitivity, losses, etc.

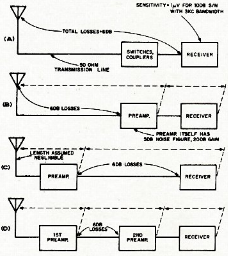

Fig. 1.—Various placements of preamplifiers discussed in the text.

BASIC RECEIVER SET-UP

Fig. 1A is typical of the usual receiver or transceiver installation. The receiver sensitivity shown is typical for many commercially available units.

The first step in evaluating the **total** receiving system sensitivity is to sum all the line losses between the receiver and the antenna. This includes the normal transmission line loss for a given length of cable on a specific band as well as the connector, send-receive switch, other switches and measuring and filtering device losses. There is also an additional loss if the transmission line is not operating at unity s.w.r. (which will be the same under receiving conditions if the receiver has a 50 ohm input). This additional loss can be determined from the graph of Fig. 2 and should be added to the db. sum of all the other losses.

The second step is to convert the receiver sensitivity to unity signal-to-noise ratio output and also to express the sensitivity in dbm. This is necessary because receiver sensitivities are expressed by manufacturers for a multitude of signal-to-noise ratios and the only way to compare them is to reduce or convert them to a common base.

From Fig. 3, for the receiver sensitivity shown in Fig. 1A, it is seen that the 1 microvolt sensitivity is equal to —107 dbm. Since this sensitivity is for a 10 db. signal-to-noise ratio output, it must be improved to 10 db. less or —117 dbm. for unity signal-to-noise ratio sensitivity. The direct reduction in sensitivity with decrease in signal-to-noise ratio is possible because a receiver is a linear amplifying device. If the receiver sensitivity were stated for 15 db. signal-to-noise ratio, for instance, —15 db. would be added to the value determined from Fig. 3. From Fig. 4, then, using the bandwidth stated in Fig. 1A for the receiver sensitivity value, one can draw a line between 3 Kc. on the left scale and —117 dbm. on the centre scale to find the noise figure at 21 db. Such a value is fairly typical of medium grade receivers but not really obvious from just the sensitivity figure.

To determine the effect of the cable losses, one has only to degrade the sensitivity and noise factor figures by the appropriate db. value. The sensitivity at the antenna terminals is then —111 dbm. for unity signal-to-noise ratio and the corresponding noise factor is 27 db. One can use the charts

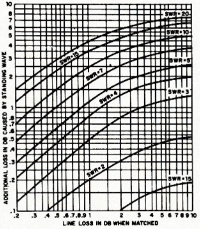

Fig. 2.—Additional transmission line loss introduced by various standing wave ratios. This additional loss in db. must be added to the sum of all other line losses in db.

* Reprinted from "CQ," November 1968.

"backwards" to convert the sensitivity into whatever form of expression is desired. For instance, for a 10 db. signal-to-noise ratio, 10 db. is added to the sensitivity (producing —101 dbm.) and from Fig. 3 this is found to be 2 microvolts. Thus, two times the voltage is required at the antenna to produce the equivalent of a 10 db. signal-to-noise ratio at the receiver. In this simple case, this factor should be obvious from the transmission line loss since a 6 db. drop will produce half the terminal voltage.

PREAMPLIFIER AT RECEIVER

One idea that may come to mind to correct the relatively poor receiving situation shown in Fig. 1A is the use of a preamplifier at the receiver as shown in Fig. 1B. A fairly good preamplifier, at least for the high frequency bands, having a noise figure of 5 db. and gain of 20 db. is used. No change is made in the transmission line between the preamplifier and the antenna, and the transmission line between the preamplifier and receiver is assumed to be of negligible length and loss.

Microvolts	dbm.
0.1	—127.0
0.2	—121.0
0.3	—117.5
0.4	—115.0
0.5	—113.0
0.6	—111.5
0.8	—109.0
1.0	—107.0
2.0	—101.0
3.0	—97.5
4.0	—95.0
5.0	—93.0
6.0	—91.5
7.0	—90.0
8.0	—89.0
9.0	—88.0
10.0	—87.0

Fig. 3.—Microvolt to dbm. conversion scale for a nominal 50 ohm receiving system.

Calculating the overall receiver system sensitivity is done by first regarding the portion from the preamplifier back to the antenna the same as the situation shown in Fig. 1A. Thus, the preamplifier noise figure is raised by the line loss to 11 db. and its gain reduced by the line loss to 14 db. The noise figure of the original receiver (21 db.) remains unchanged. The total noise figure is found from the following formula which relates the individual noise figures of several successive units to an overall figure:

$$NF_{TOTAL}\ (\text{db.}) = 10 \log \left(NF_1 + \frac{NF_2 - 1}{G_1} + \frac{NF_3 - 1}{G_1 G_2}\right)$$

Since only two stages are involved in this case, the part of the expression, $NF_3 - 1/G_1G_2$. drops out and the resultant expression is:

$$NF_{TOTAL}\ (\text{db.}) = 10 \log \left(11 \text{ db.} + \frac{21 \text{ db.} - 1}{14 \text{ db.}}\right)$$

$$= 10 \log \left(12.5 + \frac{130 - 1}{25}\right)$$

$$= 12.5 \text{ db.}$$

The formula is simple to use as long as one remembers to convert the db. values for NF_1, NF_2 and G_1 into numerical ratios, using a simple power db. scale, before inserting these values into the formula.

The resultant noise figure (12.5 db.) is a considerable improvement although it does not equal the 5 db. which the preamplifier alone is capable of producing. The overall sensitivity can be found from Fig. 4 as —127 dbm. This assumes that the preamplifier bandwidth is not narrower than the 3 Kc. receiver bandwidth which, of course, would be the actual case. The —127 dbm. figure, if converted into a microvolt sensitivity, would produce about 0.3 microvolts for 10 db. signal-to-noise ratio.

If one wanted to still further improve the overall receiving sensitivity, several choices are possible. One could replace the transmission line and other components in it with types having a significantly lower loss. One could also replace the preamplifier with an advanced type having only a 1-2 db. noise figure. One could also try to locate the present preamplifier in such a manner, that its 5 db. noise figure is used to better advantages. Assuming that the transmission line loss cannot be economically reduced and building of a significantly lower noise level preamplifier is not practical, the next situation considers the effect of relocation of the preamplifier.

PREAMPLIFIER AT ANTENNA

Since the preamplifier noise figure is increased by the attenuation of the transmission line between it and the antenna, the logical location to preserve the preamplifier's noise figure would seem to be at the antenna itself, as shown in Fig. 1C. In this location the noise figure and the gain of the preamplifier are not degraded by the line loss preceding the unit. The transmission line loss does, however, degrade the basic receiver noise figure, the same as in Fig. 1A. The resultant total noise figure and sensitivity can be calculated using the formula previously given. In this case, considering no line losses added to the preamplifier and the 6 db. line losses added only to the original receiver noise figure, we have:

$$NF_{TOTAL}\ (\text{db.}) = 10 \log \left(5 \text{ db.} + \frac{27 \text{ db.} - 1}{20 \text{ db.}}\right)$$

$$= 10 \log (8.2)$$

$$= 9.14 \text{ db.}$$

The corresponding sensitivity is —130 dbm., or converted into terms comparable to the given receiver sensitivity, 0.2 microvolt for a 10 db. signal-to-noise ratio. This resultant

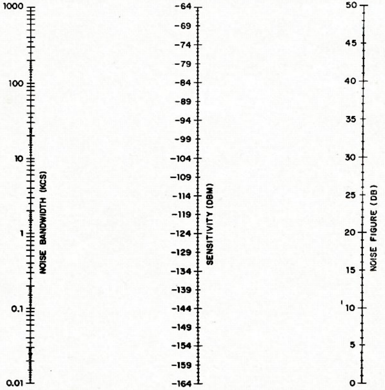

Fig. 4.—Nomograph for dbm. sensitivity and noise figure comparison.

noise figure and sensitivity is certainly an improvement over the situation outlined for Fig. 1B.

If one wished to consider still further improvements in the overall receiver system sensitivity, the practical approaches begin to narrow rather rapidly. For instance, the use of a really advanced type of preamplifier having a noise factor of 1-2 db. (and the same 20 db. gain) would only produce a total noise figure of 8.2 db. (or a sensitivity of 0.19 microvolt for a 10 db. signal-to-noise ratio). Certainly the effort required to build this type of preamplifier would hardly be worth the minor gain in sensitivity that would be achieved.

The other possible approaches to improved system receiver sensitivity involve again either the reduction in the transmission line losses or the use of an additional preamplifier (or post-amplifier as it is called when installed in conjunction with a preamplifier). Assuming that economic factors obviate the first possibility, it is interesting to consider the advantages derived from the installation of two amplifiers.

COMBINED PRE AND POST AMPLIFICATION

Fig. 1D shows the use of two amplifiers, one at the antenna as a preamplifier and another at the receiver or a post-amplifier. If possible, the preamplifier should be of better quality than the post-amplifier but it is assumed for this example that both amplifiers are of the same quality in order to derive some direct comparison to the use of the amplifier in the foregoing examples.

Looking "backwards" from the preamplifier to the antenna, the noise figure and the gain data remain the same as in Fig. 1C. Also looking "backwards" from the post-amplifier to the preamplifier, the noise figure and gain data for the post-amplifier are the same as that for the preamplifier in Fig. 1B. The noise figure of the receiver remains unchanged. Combining these noise figures into the previously given formula, we have:

$$NF_{TOTAL}\ (\text{db.}) = 10 \log \left(5\ \text{db.} + \frac{11\ \text{db.} - 1}{20\ \text{db.}} + \frac{21\ \text{db.} - 1}{20\ \text{db}\ .\ 14\ \text{db.}}\right)$$

$$= 10 \log (3.32)$$

$$= 5.2\ \text{db.}$$

Thus, an overall noise figure almost exactly equal to that of the preamplifier can be achieved with this arrangement. Converted into a sensitivity figure, the noise figure produces —134 dbm. or, otherwise stated, 0.13 microvolt for 10 db. signal-to-noise ratio.

If one looks closely at the formula, it will be noted that the overall noise figure goes closer to 5 db. as the post-amplifier is moved along the transmission line closer to the preamplifier. If one were dealing with an extremely long and lossy transmission line, it might well prove worthwhile to locate the post-amplifier in the middle of the transmission line run and even use a second post-amplifier at the receiver. Also, it should be obvious that the amplifier with the lowest noise figure should be used as the preamplifier if two amplifiers are available and physical conditions permit this type of placement. To use the lower noise figure amplifier as the post-amplifier would be wasting its advantage.

GRAPHING SYSTEM PERFORMANCE FOR ONE PREAMPLIFIER

From the data which has been presented, it should be possible for anyone to calculate their receiving system sensitivity and to understand what steps might be taken to improve it. Deciding upon which steps are the most economical, both in terms of effort and equipment expense, can often be resolved by graphing the various possibilities as shown in Figs. 5 and 6. Both graphs are based upon the conditions noted on the graphs but similar ones can be produced for any given receiving situation.

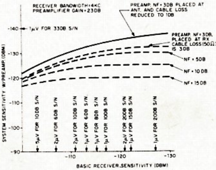

Fig. 5.—Resultant overall sensitivity as the result of the use of various preamplifiers.

Fig. 5 relates the improvement in overall receiver system sensitivity to the use of receivers with different sensitivities with various quality preamplifiers. Several conclusions can be drawn from an examination of the graph. First, almost any type of preamplifier, no matter where it is placed, can considerably improve the performance of a really poor receiver. Also, the use of an extremely low noise figure preamplifier with a poor receiver produces a negligible improvement as compared to the use of an easier to build and less expensive preamplifier having only a moderately good noise figure.

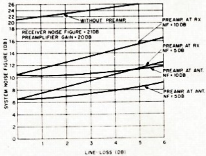

Fig. 6.—System noise figure as affected by line loss, preamplifier noise figure and preamplifier placement.

Secondly, the inept use of a preamplifier of poor quality with a good, sensitive receiver can actually degrade the overall receiving system sensitivity. It is important to realise that this condition may not really be obvious when the preamplifier is used. The preamplifier provides gain and an "apparent" increase in signal strength will be observed for moderate to strong signals but actually very weak signals will **not** be heard as well as before. For instance, note from Fig. 5, the use of a preamplifier having a noise figure of 10 db. with a receiver having a sensitivity of 1 microvolt for a 20 db. signal-to-noise ratio. For the conditions shown, the total receiving sensitivity is actually reduced 5 db. by using the preamplifier.

Thirdly, the graph provides some indication of how worthwhile it is to reduce the preamplifier noise figure to the lowest possible value. Again, for the conditions shown, there is a notable gain achieved in reducing the preamplifier noise figure from 15 db. to 10 db. or from 10 db. to 5 db. There is a smaller gain in reducing the noise figure from 5 db. to 3 db. and, although not shown on the graph, an almost non-existent gain in reducing the noise figure from 3 db. to 0 db. As the noise figure of the preamplifier becomes less and less, the only way to squeeze still better performance from the receiving system is to either relocate the preamplifier or reduce the transmission line losses.

Fig. 6 presents still another interesting view of a receiving set-up. In this case, the total receiving system noise figure is plotted as a function of the transmission line loss and the use of preamplifiers of different noise factors at both the antenna and at the receiver.

A number of conclusions can again be formed from examination of the graph. The use of the lowest noise figure preamplifiers at the antenna produces the lowest overall system noise figure, but only as long as the transmission line attenuation remains high. Which is the most convenient and economical approach in a real situation, to put a preamplifier at the antenna or to place it at the receiver but replace the transmission line with one having lower losses? A preamplifier of moderate quality (10 db. noise figure) placed at the antenna will perform slightly better than a preamplifier having a 5 db. noise figure placed at the receiver, as long as the transmission line attenuation does not fall below 5 db. for the situation shown.

Another interesting point learned from the graph is that a preamplifier having a 10 db. noise figure will perform just as well at the receiver as one having a 5 db. noise figure, providing transmission line losses are reduced to a minimum. So, the question of which course to follow depends upon whether it is more economical and convenient to build a lower noise preamplifier or to replace the transmission line. As noted before, it is really useless to carry both factors to their ultimate and some choice or balance between the two must be made in any given situation.

(Continued on Page 17)

MOON BOUNCE

Arising out of the Convention held at Birchip in the Victorian Western Zone on Saturday and Sunday, 2nd and 3rd November, 1968, a desire was expressed that Moon Bounce information should be made available.

These experiments, carried out by Ray VK3ATN, began early in 1966 with Mike Staal, K6MYC (in California), K2MWA/2 (a club station in New Jersey) and K0IJN (in Minessota) using 144.090 Mc. (2 metres).

shared by Ray with W. (Bill) Conkel, W6DNG. The award was presented to Ray by the W.I.A. at a dinner in 1967. It reads: "Presented to W. (Bill) Conkel, W6DNG, and T. Ray Naughton, VK3ATN, for advancing the frontiers of Amateur Radio, proving communications via Lunar reflection to be within the realm of conventional amateur operation."

So far four stacked rhombics with sides 342 feet long and having a width

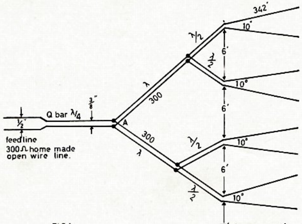

FIG.1.

N.B.—No transpositions in the feeding harness. Reason: can be used for 52 or 432 Mc.

At first, two stacked rhombics were used, each side being fifty wavelengths (342 feet), but the echos received in March and April 1966 were weak. To overcome this, an additional two rhombics of the same dimensions were added to the stack.

The times of the Moon Bounce were used to calculate the relation of the antenna at Birchip to the moon's orbit and also to determine when the moon will be in the "window" for that antenna.

Ray was able to copy every try made by Mike K6MYC from May 1966, but Mike was not able to receive the signals sent from Australia until Mike made some adjustments to his equipment.

The first two-way contact by way of the moon's surface was made with K2MWA/2 on 26th November 1966. This club, which includes Dick Turrin, Rodger Alison, Ed. Chinnock and others, used a sixty-foot commercial dish running 1,000 watts from Crawford Hill in southern New Jersey. This contact created a new world record of 10,417 miles, using any frequency for the Moon Bounce technique by either commercial or amateur stations.

It will probably stand for a long time because it is difficult to get much further away and still have a "window" in which the moon would appear for both stations at the same time.

As a result of this achievement, the A.R.R.L. (American Radio Relay League) Technical Award for 1966 was

of 59 feet 3 inches have been used to concentrate the signal on the moon's surface when the moon appears in the antenna's window for a brief period twice in twenty-nine days. The moon is approximately over the Hawaiian Islands when this occurs. During this limited period the stations use a minute for sending the call and a minute for

giving the report, i.e. two minutes transmitting period followed by two minutes receiving period.

The moon does not reflect like a mirror because of its curved and varied surface, but the bounce is more in the form of a splatter and only a very small amount of the signal is returned to the earth. Therefore the echo from the Moon Bounce may be heard by the sending station as well as any other station which has the moon in its "window".

Because the rhombics are so long and the moon crosses the sky on a different course from day to day, only limited use of Moon Bounce can be made at present, using this fixed antenna technique. To overcome the limitation of the fixed rhombics, a fifty-foot diameter dish which can follow the course of the moon and other bodies in space is under construction. This will lift the useful time of transmission and reception from eight to twelve minutes twice a month, to whenever the moon is above the horizon (approximately 10 hours every day).

The second two-way contact from Australia was made with Mike K6MYC at the end of December 1966 and regular skeds have been maintained. Mike's contact is important in that home-made equipment was used at both ends.

The stacked rhombic antennae are supported by four steel towers. They are made of hard drawn copper wire (14 s.w.g.) which is kept at a constant tension of 125 lbs. by means of 23 lb. concrete weights at the two side towers. These concrete weights are a few feet off the ground and are connected to the side insulators of the rhombics by ⅛" diameter nylon rope halyards running through 1½" nylon pulleys attached to the towers.

To adjust the shape of the rhombics a theodolite was set up beneath the feed point and the included angle was

(Continued on Page 19)

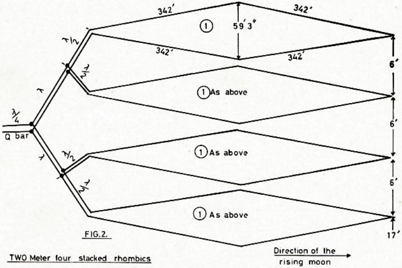

FIG.2.

TWO Meter four stacked rhombics

A 300 W. P.E.P. 2 METRE S.S.B. TRANSMITTER

A. S. LUNDY, VK2ASI*

Following on from the 6 metre s.s.b. transceiver ("A.R.," Sept. '68), it was decided to try a similar unit on 2 metres. In this case high power was required as extended ground wave was contemplated using stacked 10 element yagis. Owing to the larger p.a. box needed to accommodate the parallel line tank circuit and the extra stages involved in double conversion, it was only possible to fit a transmitter on the same size chassis as the 6 metre transceiver. The author already had an all transistor receiver on 2 metres, so this was no disadvantage.

CHASSIS

The chassis was formed from half hard 16 gauge aluminium sheet. The dividing partitions are 3" high with a ½" turned at right angles top and bottom to allow riveting to the chassis and the attachment of the v.f.o. box and p.a. box lids with self-tapping screws.

The v.f.o. drive is two 6-to-1 Jackson verniers and knobs, same as in the 6 metre unit. The 6/40 final is mounted horizontally and adequate ventilation must be provided for in the chassis under it and in the lid above it.

* 36 Otho Street, Inverell, N.S.W., 2360.

The p.a. tuning capacitor is a butterfly condenser from a SCR522 unit, which has been double spaced by removing every second rotor and stator plate, then re-positioning the stator plates. It has three rotor and two stator plates left per side.

CIRCUIT

The circuit up to the first mixer is similar to the 6 metre unit, except that a 6BL8 is used as an audio amplifier to give a bit of gain in reserve. A valve circuit is used as a carrier oscillator instead of a transistor.

A 6BE6 is used as a first mixer to combine the 6 Mc. u.s.b. signal with the 15.1 to 15.3 Mc. from the v.f.o. to give 21.1 to 21.3 Mc. Checking of the signal quality and initial calibration can now be done using a 15 metre receiver.

The 6 Mc. filter was "home-brewed" using disposal FT243 crystals, and, as a couple of hundred were available on this frequency to work with, this frequency was chosen. Some mounted and aligned filters are available at $7.

The 21 Mc. signal is inductively coupled from L4 to L5 which is spaced ½" away. L5 provides a push-pull signal to the grids of a 6J6 twin triode which runs as a balanced mixer. An injection frequency of 123 Mc. is used so as to come out on 144.1 to 144.3 Mc. u.s.b. The overtone oscillator circuit is the one supplied by the 61.5 Mc. crystal manufacturer. Doubling to 123 Mc. occurs in the plate circuit.

It was necessary to use a cathode follower stage between the overtone oscillator and the balanced mixer to prevent pulling of the crystal by the 21 Mc. s.s.b. input. This overtone circuit seems to be easily pulled by circuit variations, so make sure that the slugs in the series inductance and the plate coil are firmly secured.

Inductive coupling is used through to the final, the driver and final grid circuits L10 and L12 are connected first and are resonated on 2 metres with the valve input capacitance. The valve screen and cathode capacitors must be connected and resonance should be achieved by slight adjustment of the turns spacing.

The balanced mixer and driver plate coils L9 and L11 are then connected and adjusted for maximum output by means of the 0-6 pF. trimmers. Also adjust the turns spacing so as the trimmers are almost at maximum so as to get capacitive balance with the 5 pF. mica capacitor at the other side of the coil.

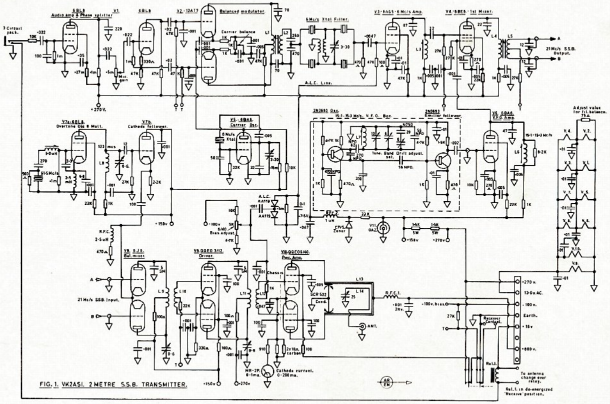

FIG. 1. VK2ASI. 2 METRE S.S.B. TRANSMITTER.

L9 and L10 only need slight coupling but L11 and L12 need to be coupled into each other to get sufficient drive.

The final has a parallel line tank circuit made from 3/16" copper tubing which was silver plated, and the tuning condenser stator plates also form part of the line. Flexible copper braid connects from the tuning condenser to the final plate pins.

The 100 pF. capacitors on the driver and final screens have ½" leads which make them a series tuned circuit on 2 metres.

Output should be detectable at 6 Mc. (V3), at 21 Mc. and at the balanced mixer, using the g.d.o. as a detector. The 6/40 bias is set so as to give 30 to 35 mA. standing current (screen current less than 1 mA.) and should go up to 180 to 200 mA. on long syllables with the meter used, which responds fairly quickly. Screen current will then be about 20 mA.

No instability problems were encountered with the driver or final, but if it is desired that maximum r.f. occur at minimum current, then some external neutralisation of the final will be necessary.

When first tried, the s.s.b. signal put out by the unit was not resolvable, this was a threshold effect in that as long as the 2 metre output was kept below about 5 watts, or the final disabled, no trouble was experienced, but as soon as the output exceeded this threshold the signal on 2 and 15 metres immediately degenerated into an unintelligible snarl.

This effect was traced to the v.f.o., and I assume that the 2 metre output was being rectified by the transistor junction and causing severe f.m. or what-have-you in the v.f.o. The v.f.o. circuit, which was built on a piece of matrix board was removed from its position under the chassis and placed inside the v.f.o. box. This cured the trouble.

COIL DATA

The following coils are found on 7 mm. slug-tuned formers:

L1—2 x 20 turns bifilar 30 B. & S.
L2—20 turns 30 B. & S., same former, spaced 3/16" from L1.
L3—35 turns 30 B. & S.
L4—16 turns 28 B. & S.
L5—20 turns 28 B. & S.
L6—16 turns 28 B. & S.
L7, v.f.o. coil—10 turns 20 B. & S. on ½" former, coat with Araldite.

The following coils are 3/8" inside diameter, wound with 20 B. & S.

L8—4 turns 3/4" long.
L9—6 turns 5/8" long.
L10—4 turns close wound.
L11—6 turns 3/4" long.
L12—3 turns 1/2" long.
L13—3/16" copper tubing as per diagram.
L14—1/8" copper tubing hairpin, 2" long each leg.

RFC1—28 B. & S. close wound on 1/4" former 1/2" long.

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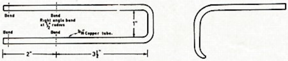


L13. PLAN. L13. SIDE VIEW.

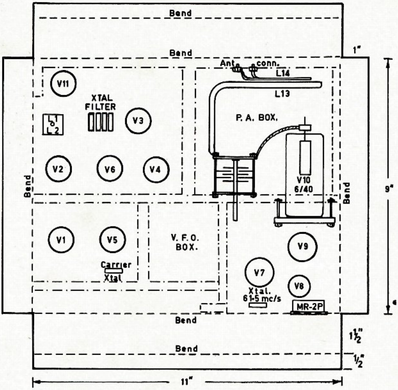


FIG. 2. CHASSIS LAYOUT.

FINDING TRUE RECEIVER SENSITIVITY

(Continued from Page 14)

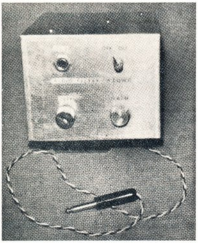
SUMMARY

This article has tried to present a method, using the minimum of mathematics, by which any Amateur can calculate or graph what is really happening with his receiving set-up. The material presented is only valid absolutely for 50 ohm (transmission) line systems but the relative results are applicable to other impedance systems also. Some technical inaccuracies are present in the methods used but they really are of a minor nature and probably will never be of concern in an actual situation. For instance, signal-to-noise ratios instead of signal-plus-noise to noise ratios were used for the receivers.

There may also be other reasons present in a specific situation for the choosing of a location for a preamplifier or post-amplifier. For instance, in a situation where noise pickup by the transmission line is fairly high, the use of a preamplifier by the antenna might show actual results far better than those indicated by strict formula analysis. In another situation where only part of a transmission line is subject to a severe noise field, it might be best to place a preamplifier and post-amplifier in the line immediately before and after the affected section.

No matter what the situation is, however, an initial analysis using the methods described in this article will produce a clearer picture of what the overall situation is like and, hopefully, produce some ideas on the best way to go about hearing the weak ones with a minimum of strain.

AMATEUR FREQUENCIES:
USE THEM OR LOSE THEM!



Front view of the Clipper-Filter. From left to right: J1 and S1 are at the top and R1 and R2 are at the bottom.

A C.W. CLIPPER-FILTER USING FETs*

R. W. FISH, W2OWF

The photographs and drawings show a c.w. clipper-filter that uses N-channel FETs. Although this device was designed primarily as an experiment in the use of solid-state circuits, it is quite practical, particularly when used with the present-day transceiver that offers only 2,500 cycles selectivity for c.w. work. Having a bandwidth of about 90 cycles at 10 db. down and approximately 450 cycles at 40 db. down (see Fig. 2), the gadget does a very nice job even with receivers having 500 cycles selectivity. There is no ringing or instability evident in the clipper-filter, and the power drain from a self-contained 22½ volt battery is only about 7 mA.

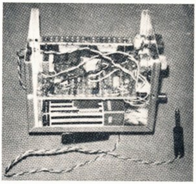
CIRCUIT DETAILS

The circuit is based on time-proven vacuum-tube designs described in "QST" in recent years by Grammer,[1] Campbell[2] and Albert.[3] Referring to Fig. 1, CR1 and CR2 are positive and negative series diode limiters. Positive voltage is applied to the anodes of CR1 and CR2, forward biasing the diodes into conduction. Positive pulses above the bias level set by R1 are clipped by CR1, and negative pulses by CR2.

Q1 through Q4 are audio amplifiers. To avoid possible overload, the source resistors of Q1 and Q2 are not bypassed. Additional overload protection is provided by an a.l.c. circuit between the drain lead of Q4 and the cathode of CR2. A portion of the signal developed across the primary of T4 is rectified by CR3, and the resulting d.c. voltage is used to reverse bias CR2.

Between each of the amplifiers is a series resonant circuit (e.g. L1/C1/C2 between Q1 and Q2) that peaks at about 950 cycles, and a parallel resonant circuit (e.g. L1/C1 between Q1 and Q2) that presents an audio notch at approximately 1,800 cycles.

T4 matches the collector impedance of Q4 to high impedance (2,000 ohms or more) headphones.



View of the Clipper-Filter showing the battery and main circuit board.

CONSTRUCTION

The c.w. clipper-filter was constructed in a 4 x 5 x 6 inch minibox. L1, L2 and L3 were made from 7-hy. filter chokes by removing the frame and "I" laminations (bar) from each inductor. Because the resulting inductances were not identical, slightly different values of capacitance were used with each choke.

The tuned circuits were adjusted before assembly and then checked and re-peaked where necessary by slight alteration of capacitor values. Very little re-peaking was actually required.

As measured, the chokes used ranged in value from 1.54 to 1.69 hy., and each inductor had a Q of 14. C1, C3 and C5 measured from 0.0047 to 0.0069 uF., and C2, C4 and C6 measured from 0.012 to 0.018 uF.

As shown in the photographs, perforated circuit board was used to support the parts. A metal chassis should not be used because it will adversely affect the Q of the chokes, resulting in a loss of gain and selectivity.

TESTING AND USE

If suitable test equipment is available for measuring inductance and capacitance, it's no chore to resonate the series-tuned circuit between each stage at 950 cycles and to resonate the parallel-tuned circuit between each stage at 1,800 cycles. However, if the test gear cannot be obtained, it is best to build the clipper-filter using the minimum capacitance value for each range mentioned previously and then add small amounts of capacitance as necessary until the desired band-pass curve is obtained. Proceed as follows:

So that no clipping occurs, set the arm of R1 at maximum resistance above ground. Connect the output of an audio generator to P1 and connect an oscilloscope or an a.c. v.t.v.m. across J1. Use a 2,200 ohm ½ watt composition resistor as the output load for T4. Vary the frequency of the audio generator from

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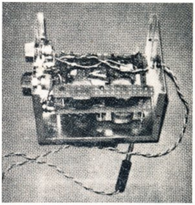


Side view of the Clipper-Filter showing L1, L2 and L3 sandwiched between strips of perforated board.

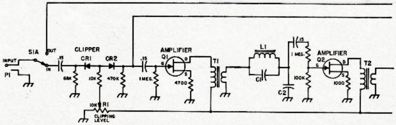


Fig. 1.—Schematic diagram of the Clipper-Filter. Capacitance is in uF. Capacitors marked with polarity are electrolytic; all others are Mylar or silver mica. Resistance is in ohms, K equals 1000. ½w. type.

BT1—22½ volt battery.
C1-C6 inc.—See text.
CR1, CR2, CR3—Small signal silicon diode (1N914).
L1, L2, L3—7 hy. 50 mA. filter choke modified as described in text.
Q1-Q4 inc.—N-channel FET, TIS14 used, 2N3819 or MPF102 suitable.

* Reprinted from "QST" for February 1969.

1 Grammer, "An Accessory for C.W. Reception," "QST," July 1950, p. 11.

2 Campbell, "Modernising the C.W. Clipper-Filter," "QST," December 1956, p. 36.

3 Albert, "Greater Selectivity with the C.W. Clipper-Filter," "QST," September 1957, p. 24.

PROVISIONAL SUNSPOT NUMBERS

MARCH 1969

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	132	16	158
2	111	17	170
3	103	18	211
4	108	19	192
5	117	20	196
6	123	21	204
7	115	22	207
8	108	23	157
9	113	24	146
10	107	25	152
11	101	26	149
12	85	27	156
13	88	28	141
14	90	29	142
15	114	30	158
		31	138

Mean equals 138.5.

Smoothed Mean for September 1968: 107.1.

—Swiss Federal Observatory, Zurich.

— . . . —

C.W. CLIPPER-FILTER

(Continued from Page 18)

500 to 2,000 cycles while making a graph of the output voltage. If necessary, change C1 through C6 to obtain the desired peak, notch and bandpass. For example, if the peak frequency is too high, increase C1, C3 or C5, or any combination of these capacitors as necessary. If the notch frequency is too high, increase C2, C4 or C6, or any combination of these capacitors as necessary. Be careful not to overload the clipper-filter or the gadget will appear to have a very broad bandpass.

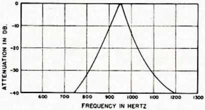


Fig. 2.—Selectivity Curve of the Clipper-Filter.

To use the clipper-filter, set R1 as mentioned above. Insert P1 in the receiver headphone jack, and plug high impedance (2,000 ohms or more) headphones in J1. Then adjust R2 so that there is no apparent difference in the strength of a c.w. signal with the unit switched in or out. Finally, set R1 at the desired clipping level.

MOON BOUNCE

(Continued from Page 15)

adjusted by means of turn-buckles in each of the four steel halyards at the driven end tower. Thus, with the concrete weights at the sides and the buckles at the end, the shape of the rhombics are maintained in spite of temperature variations and the wind.

The stacked rhombics begin seventeen feet from the ground and are spaced six feet apart so that the total height is thirty-five feet. Experiments were made with the included angle by adjusting it between eight and twelve degrees. So far ten degrees has given the best results.

Since the antenna was originally installed with a fixed azimuth heading four fifteen-foot long "barn door tracks" have been mounted horizontally at the terminated end tower. This enables the azimuth to be varied by a little more than one degree of arc which enables the antenna to be more accurately pre-set in a position so that the moon will cross the "window" at the centre of the main lobe.

It was found that this azimuth change upset the level of the rhombics at the centre supports and this has been overcome by having the side tower halyard pulleys so attached to the supporting tower by means of hooks which can be attached to pre-set positions, depending upon the azimuth heading of the main lobe or main axis.

The antennae are fed by halfwave sections which in turn are fed by full-wave sections, as can be seen in the sketch. A quarter-wavelength "Q" bar connects the system to an open feedline. The spacing of the feedline is a half an inch and the spacing of the "Q" bar is 3/8 inch approximately, which can be varied to give lowest v.s.w.r. of about 1.05:1. In this way the impedance of about 170 ohms at "A" is matched with the 300 ohm impedance of the transmission line.

It should be noted that every effort has been made to have the whole system built as efficiently as possible, thus the reason for home-made open wire feeders with spreaders approximately 8 ft. apart and the line held taught with 200 lb. strain. This gives an essentially air spaced line approximately 120 feet long with a loss below ½ db.

—Compiled by Ronald E. Allengame, VK3AIS.

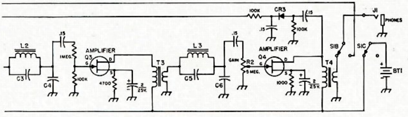


Fig. 1 (continued)

R1—10,000 ohm control, linear taper.

R2—5 megohm control, audio taper.

T1, T2, T3—Output transformer, 2,000 ohm primary to 10,000 ohm secondary.

T4—Driver transformer, 10,000 ohm primary to 2,000 ohm secondary.

NON-DELIVERY OF "A.R."

If you are not receiving your copy of "A.R." please follow these steps which will ensure the correct procedure is followed; any attempt to short circuit the system will only further delay matters.

Write to your Divisional Secretary advising non receipt of "A.R."; do not write to "A.R." The Divisional Secretary should write to the Circulation Manager "A.R.," P.O. Box 36, East Melbourne, Vic., 3002, advising him of the problem. Unless this advice is received before the 5th of the month, a further month must elapse before the member can be re-instated upon the circulation list.

Please ensure that you always advise your Divisional Secretary in writing, verbal advice will not do.

REMEMBRANCE DAY CONTEST, 1969

A perpetual trophy is awarded annually for competition between Divisions. It is inscribed with the names of those who made the supreme sacrifice, and so perpetuates their memory throughout Amateur Radio in Australia.

The name of the winning Division each year is also inscribed on the trophy and in addition, the winning Division will receive a suitably inscribed Certificate.

Objects

Amateurs in each Call Area will endeavour to contact Amateurs in other Call Areas. In addition, Amateurs will endeavour to contact any other Amateurs on the authorised bands above 52 Mc. (i.e. intrastate contacts will be permitted on the v.h.f./u.h.f. bands) for scoring purposes.

Contest Date

0800 hrs. GMT Saturday, 16th August, 1969, to 0759 hrs. GMT Sunday, 17th August, 1969.

All Amateur Stations are requested to observe 15 minutes' silence before the commencement of the contest on the Saturday afternoon. An appropriate broadcast will be relayed from all Divisional Stations during this period.

RULES

1. There shall be four sections to the Contest:—
   (a) Transmitting Phone.
   (b) Transmitting C.w.
   (c) Transmitting Open.
   (d) Receiving Open.

2. All Australian Amateurs may enter the Contest whether their stations are fixed, portable or mobile. Members and non-members will be eligible for awards.

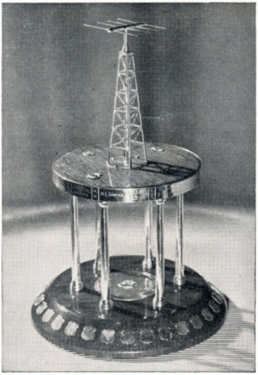
3. All authorised Amateur bands may be used and **cross-mode operation is permitted.** Cross-band operation is not permitted.

4. Amateurs may operate on both Phone and C.w. during the Contest, i.e., Phone to Phone or C.w. to C.w. or Phone to C.w. However only one entry may be submitted for sections (a) to (c) in 1.

An open log will be one in which points are claimed for both phone and c.w. transmissions. Refer to Rule 11 concerning Log entries.

5. For Scoring, only one contact per station per band is allowed. However, a second scoring contact can be made on the same band using the alternate mode. Arranged schedules for contacts on the other bands are prohibited.

6. Multi-operator stations are not permitted. Although log keepers are permitted, only the licensed operator is allowed to make contact under his own call sign. Should two or more wish to operate any particular station, each will be considered a contestant and must submit a separate log under his own call sign. Such contestants shall be referred to as "substitute operators" for the purposes of these Rules and their operating procedure must be as follows:—



Remembrance Day Contest Trophy

Phone: Substitute operators will call "CQ RD" or "CQ Remembrance Day" followed by call of the station they are operating, then the word "log" followed by their own call sign, e.g., "CQ Remembrance Day from VK4BBB log VK4BAA."

C.w.: Substitute operators will call "CQ RD de" followed by the group call sign comprising the call of the station they are operating, an oblique stroke and their own call, eg., "CQ RD de VK4BBB/VK4BAA."

Contestants receiving signals from a substitute operator will qualify for points by recording the call sign of the substitute operator only.

7. Entrants must operate within the terms of their licences.

8. Cyphers—Before points may be claimed for a contact, serial numbers must be exchanged and acknowledged. The serial number of five or six figures will be made up of the RS (telephony) or RST (c.w.) reports plus three figures, that will increase in value by one for each successive contact.

If any contestant reaches 999 he will start again with 001.

9. Entries must be set out as shown in the example, using ONLY ONE SIDE of the paper and wherever possible standard W.I.A. Log Sheets should be used. Entries must be clearly marked "Remembrance Day Contest 1969" and must be postmarked not later than **8th September, 1969.** Address them to "Federal Contest Manager, W.I.A., G.P.O. Box N1002, Perth, 6001, West. Aust." Later entries will be disqualified.

10. Scoring will be based on the table shown.

SCORING TABLE

From \ To	VK0	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK8	VK9
VK0	–	6	6	6	6	6	6	6	6	6
VK1	6	–	1	1	2	3	5	4	6	5
VK2	6	3	–	1	2	3	5	4	6	5
VK3	6	4	1	–	2	1	4	3	6	5
VK4	6	3	1	2	–	3	6	5	4	3
VK5	6	5	2	1	3	–	4	3	3	6
VK6	6	6	2	1	4	2	–	3	5	6
VK7	6	5	1	1	3	2	5	–	5	6
VK8	6	5	1	1	2	3	6	4	–	3
VK9	6	5	1	2	3	4	5	6	1	–

Note.—Read table from left to right for points for the various call areas.

In addition, all intrastate contacts on bands 52 Mc. and above are worth 1 point each.

Portable Operation: Log scores of operators working outside their own Call Area will be credited to that Call

EXAMPLE OF TRANSMITTING LOG

Date/ Time G.M.T.	Band	Emission and Power	Call Sign Worked	RST No. Sent	RST No. Received	Points Claim.

Note.—Standard W.I.A. Log Sheets may be used to follow above form.

EXAMPLE OF RECEIVING LOG (VICTORIAN S.W.L.)

Date/ Time G.M.T.	Band	Emission	Call Sign Heard	RST No. Sent	RST No. Received	Station Called	Points Claim.
Aug. '69							
16 0810	7 Mc.	A3 (a)	VK5PS	58002	—	VK6RU	1
16 0812	"	"	VK6RU	59007	—	VK7EJ	4
16 1035	52 "	A3	VK4ZAZ	56010	—	VK5ZDR	2
16 1040	"	"	VK3ALZ	59025	—	VK3QV	1

Note.—Standard W.I.A. Log Sheets may be used to follow the above form.

Area in which operation takes place, e.g. VK5ZP/2. His score counts towards N.S.W. total points score.

11. All logs shall be set as in the example shown and in addition will carry a **front sheet** showing the following information:—

Name.............................Section..................
Address......................Call Sign...................
..........................Claimed Score.............. ....
No. of Contacts..................

Declaration: I hereby certify that I have operated in accordance with the Rules and spirit of the Contest.

Signed..............................
Date ....

All contacts made during the Contest must be shown in the log submitted (see Rule 4). If an invalid contact is made it must be shown but no score claimed.

Entrants in the Open Sections must show c.w. and phone contacts in numerical sequence.

12. The Federal Contest Manager has the right to disqualify any entrant who, during the Contest, has not observed the regulations or who has consistently departed from the accepted code of operating ethics. The Federal Contest Manager also has the right to disallow any illegible, incomplete or incorrectly set-out logs.

13. The ruling of the Federal Contest Manager of the W.I.A. is final and no disputes will be discussed.

Awards

Certificates will be awarded to the top scoring stations in Sections (a) to (c) of Rule 1 above, in each Call Area. There will be no outright winner for Australia. Further Certificates may be awarded at the discretion of the Federal Contest Manager.

The Division to which the Trophy will be awarded shall be determined in the following way.

To the average of the top six logs shall be added a bonus arrived at by adding to this average the ratio of logs entered to the number of State Licensees (including Limited Licensees), multiplied by the total points from all entries in Sections (a), (b) and (c) of Rule 1.

$$\text{Average of top six logs} + \left\{ \frac{\text{Logs Entered}}{\text{State Licensees includ. Z Calls}} \times \begin{array}{c}\text{Total Pts. from} \\ \text{all Entrants in} \\ \text{Sect. (a) (b) (c)}\end{array} \right\}$$

VK1 logs and scores will be added to VK2, similarly VK8 to VK5, and VK0 to VK7.

Also VK9 logs and scores will be added to the Division which is geographically the closest, e.g.

New Guinea, Papua and New Britain .... to VK4
Norfolk Island .... „ VK2
Christmas and Cocos Islands „ VK6

Acceptable logs for all Sections shall show at least five valid contacts.

The trophy shall be forwarded to the winning Division in its container and will be held by that Division for the specified period.

RECEIVING SECTION
(Section D)

1. This section is open to all Short Wave Listeners in Australia, but no active transmitting station may enter.

2. Contest times and loggings of stations on each band are as for transmitting.

3. All logs shall be set out as shown in the example. The scoring table to be used is the same as that used for transmitting entrants and points must be claimed on the basis of the State in which the receiving station is located. A sample is given to clarify the position.

It is not sufficient to log a station calling CQ—the number he passes in a contact must be logged.

It is not permissible to log a station in the same call area as the receiving station on the m.f. and h.f. bands 1.8-30 Mcs., but on bands 52 Mcs. and above such stations may be logged, once only per band, for one point. See example given.

4. A station heard may be logged once on phone and once on c.w. for each band.

5. Club receiving stations may enter for the Receiving Section of the Contest, but will not be eligible for the single operator award. However, if sufficient entries are received a special award may be given to the top receiving station in Australia. All operators must sign the Declaration.

Awards

Certificates will be awarded to the highest scorers in each call area. Further Certificates may be awarded at the discretion of the Federal Contest Manager.

NOTES ON 1969 N.F.D. — AS SEEN BY THE VK2AAH/P GROUP

The VK2AAH/P expedition this year was similar in form to those of 1966, 1967 and 1968.

All antennas were transported to the site (a 4,000 ft. mountain, 60 miles west of Sydney) on the ski bars of two cars.

These antennas comprise:
- A two element 14 Mc. Yagi.
- A two element 21 Mc. Yagi.
- A three element 28 Mc. Yagi.
- Two ¼-wave verticals for 7 Mc. (one becomes base loaded for 3.5 Mc.).
- A four element Yagi for 52 Mc.
- A four element Yagi for 146 Mc.
- A ten element Yagi for 144 Mc.
- An umpteen element stacked colinear for 144 Mc.

We arrived at the site at 10 o'clock local time and by 1400 hours all was ready.

The scattering of antennas was a pretty sight, and a good sound to hear was the purr of the 7.5 KVA alternator with its 12 h.p. four-cylinder "donk".

The sun was blazing down on the scene as our cooks prepared the first field day meal. Great dollops of stew, with a pint of mashed potatoes each! Sweets? Yes! Plum pudding and cream, washed down into one's innards with a pint of black coffee.

Did I say cooks? I mean Chefs!

At the witching hour of 1600 hours local, all stations opened up.
Carl VK2BKM on 7 Mc.
Syd VK2SG on 14 Mc.
Charlie VK2KM on 21 Mc.
David VK2ZVW on 144 Mc.
Wal VK2AXW on 52 Mc.

Harold VK2AAH was looking over 3.5 Mc., but it was expectedly dead.

7 Mc. ran well at all times, with split frequency W contacts giving us ample points during hours of darkness.

14 Mc. was hot all the time except for a few daylight hours on Sunday. Nearly 3,000 points on this band tells its own story.

21 and 28 Mc. behaved reasonably well, with over a thousand points for each band.

The v.h.f. men performed great feats to knock out six hundred points.

Little 3.5 Mc., with its barefoot mobile KWM2, gave us 200 points, and the interesting thing was that no equipment gave any trouble at all.

This included two KWM2s, two SW400s, three linears, and a fair bit of home-brewed v.h.f. gear.

All antennas stayed up, the weather was excellent, and what more could one want, with a bunch of good chaps, bags of operating available, plenty of food (cornflakes, followed by sausages and eggs Sunday morning, and a nice salad at midday) and even a little time for ragchewing now and again.

But after the feast, the reckoning.

At 1600 hours local, all the above goodies had to be taken down. One feels a little sad at this time, but because of approaching darkness, one hurries about multifarious tasks.

Anyway, by 1800 hours, we were ready to go, and what were our thoughts as we drove the 85 miles back to Sydney?

Mine ran along something like: Be terrific to fall into bed (most of us had almost no sleep at all)—Jolly good score, I think—Wonder if the others (competitors) caught the 21 and 28 Mc. openings?—Good food this year—Not many real dogpiles this time—Hope Carl VK2BKM enjoyed his first Field Day—Better watch these speed limits carefully, the Datsun seems a little frisky in the mountain air—I don't—Hope Syd's okay (VK2SG) driving that VW with the 7 KVA generator in the trailer—Glad Peter and Steve were there (our S.w.l's)—Good old Laurie VK2ZJC got the 14 Mc. Yagi 42 ft. up in the air again.

And then we reached home, and Peter and I unloaded my car in the darkness. Didn't you go Field Day-ing this year?

W.I.A. Federal President's Speech to N.Z.A.R.T. Conference

(The following is the text of a speech delivered by the Federal President of the Wireless Institute of Australia (Mr. Michael J. Owen, VK3KI) at the Gisborne Conference of the N.Z.A.R.T. on Saturday, 31st May, 1969.)

May I, at this first formal opportunity, express the thanks of the Wireless Institute of Australia and my personal thanks for your invitation to attend this Conference.

When your President in Sydney, Australia, at Easter 1968, invited the Federal President of the Wireless Institute of Australia to attend your Conference, I, like everyone else, was confident that our incoming President, John Battrick, VK3OR, would be here today. No doubt by now many of you know that for personal reasons John was forced to resign as Federal President last Easter after only one year in that office, though he remains the Institute's Region III. Director. To him and to our present Federal Secretary, Peter Williams, VK3IZ, Amateurs in this Region owe a great debt.

The Region III. Congress from which so much has stemmed, may not have come about so soon without the dedication of these two men. For this reason, I am sorry that John is not able to be here himself today.

Whilst I am talking of people, may I, without presuming to intrude on either his personal affairs or the affairs of N.Z.A.R.T., refer to your President, Harry Burton. I confess I had to read April "Break In" twice before I discovered that Harry had decided not to seek re-election this year. I would like to assure you that as an ambassador on behalf of N.Z.A.R.T., your President is extremely effective. I know he made many good friends in Australia. He sold Amateur Radio effectively, and I believe has done much to cement relationships between the W.I.A. and N.Z.A.R.T.

AMATEUR RADIO IN AUSTRALIA

Your President suggested that I should tell you something of Amateur Radio in Australia. There is much similarity in the manner in which Radio Amateurs are regulated in our respective countries. Like you, we exist by reason of suborinate legislation—regulations. In Australia this means we are effectively under the control of the Postmaster General's Department. No doubt, should the need arise, our voice would be heard in the Federal Parliament. We prefer, however, to rely heavily on our very cordial relationship with those officers who are responsible for the administration of Amateur Radio at an administrative level.

The whole trouble with this sort of system is that we become over-dependent on the personality of the individual administrator. Yet I do not see any real alternative.

It may well be that a quasi judicial system, such as the American Federal

● At the time of going to press, the Federal President of the W.I.A., Michael Owen, VK3KI, is on his way home from the N.Z.A.R.T. Conference, which was held over the week-end of 31st May/1st June. Michael's attendance was at the invitation of the N.Z.A.R.T. President made when he was in Australia last year.

Many subjects were listed for discussion with our New Zealand friends, not the least of which was the Region III. activities.

Communications Commission, with its legalistic rule-making procedures, is a luxury that our country can hardly afford. It is certainly a luxury that the Amateur Service could not afford.

Our long term security, perhaps, lies more in the hands of our national Radio Societies such as N.Z.A.R.T. and W.I.A. Strong representative and responsible Amateur organisations are, I think, a very important part of our Amateur Radio security.

Whilst I suggest that a strong national radio society is important to us all, there are, of course, some dangers in a society which is over-influential. There is a great temptation when confronted with a problem on Amateur bands, to seek to solve it by regulation.

The W.I.A. has always had a strong distaste for such a solution; indeed we seek less regulation than more—we never reject a privilege. Perhaps our attitude is partly reflected in the fact that there is no regulation of modes within different segments of our bands, though this has been suggested from time to time as a solution to specific problems.

For our sub-bands we rely on what we call a gentleman's agreement. Whilst we are not all really gentlemen, the system works remarkably well. As a basic philosophy, I think the Institute's philosophy is a very sound philosophy. The temptation to solve a particular problem by a general

Michael Owen, VK3KI, Federal President, W.I.A.

regulation seems so often to result in a restriction that has effects that were unforeseen. More important, self-discipline is surely better than a police imposed discipline.

SURVEY BY "A.R."

To give you any general picture of Amateur Radio in Australia is hard. However, it may be of interest to you if I tell you of a survey that was conducted by the Publications Committee of the Institute's journal, "Amateur Radio". This survey is probably the only reliable source of information in recent years. It is based on a staggering response equal to 30.3% of the magazine's total circulation.

This reveals that over all, 53.2% of Australian Amateurs use mainly home-made equipment and 30.6% use mainly commercial equipment. 16.2% say they use a 50-50 mixture.

This percentage of commercial gear ranges from 39% in Western Australia to 19.3% in South Australia.

In terms of money, those conducting the survey concluded that Australian Amateurs each spend an average of $132 each year on their hobby. In other words, in Australia, Amateurs, we believe, will spend this year around $560,000 on their hobby. No doubt it can be anticipated that this sum will increase a little each year, a very persuasive argument when one is seeking new advertisers in one's publications. I understand the position in New Zealand is perhaps a little different because of your import restrictions and that, therefore, there is a higher percentage of home-made equipment used in this country. I wonder whether you are really the poorer?

"AUSTRALIS" PROJECT

One aspect of Amateur Radio in Australia that has caused much interest is the "Australis" project. This project was initiated by a group of university students whose aim was to produce an Australian designed and fabricated satellite on Amateur frequencies. The W.I.A. was one of a number of sponsors to the project. In addition, the Institute has provided other assistance as requested.

The technical standard attained has attracted favourable comment from overseas. It represents a technical achievement by a small independent group that is in the best traditions of Amateur Radio. It is exactly the sort of project that our national Amateur Societies should do all in their power to foster without necessarily attempting to take over the technical initiative.

For some time now, the project has looked as though it would ultimately fail as it seemed that the satellite would not be launched due to difficulties in obtaining space on a suitable vehicle. By last Christmas, nearly all hope had been abandoned.

Now I am very pleased to be able to tell you that I now believe that this satellite will be a feature of our skies before the end of 1969. If so, it will represent a great achievement for Ama-

teur Radio and perhaps demonstrates that the Australian Amateur is still capable of technical achievement despite an apparent fondness for commercially built equipment.

This, we believe, is only the second satellite built in Australia. The first was "WRESAT", a satellite produced by the Weapons Research Establishment, largely from imported components. The Australis satellite is built almost wholly from Australian components. If my prediction turns out to be accurate, then it is probable that the satellite would be placed in a 1,000-mile polar orbit circling the earth once every 1 hour 54 minutes. It will pass in range of New Zealand Amateurs six times a day—three times in the morning and three times in the evening.

As you can no doubt appreciate, what I can say to you is severely restricted at this time. A firm announcement can be expected within the next few months. I suggest that you prepare on the basis that this satellite will fly, as the notice in fact may not be great. I can assure you that it is the wish of the Australis group that all the information possible is given to all Amateurs and immediately they can do so, all the information in their possession will be made available as widely as possible.

I.A.R.U. REGION III.

But now I would like to speak to you on the I.A.R.U. Region III. Association. It gives me great pleasure to tell you as the President of the Society that is presently providing the Secretariat, that the Interim Constitution proposed by the Secretariat following the Sydney Congress has now been accepted by three out of the four Societies concerned. The fourth Society, the Philippines, has already indicated that it would have no objection to the incorporation of the amendments proposed to the first draft. This means that we are now confident that within a matter of weeks, the I.A.R.U. Region III. Association will come into actual, formal existence.

I have no doubt that your overseas liaison officer will tell you that we have gone perhaps a little further in formulating a detailed Constitution than was expected by the delegates at the Congress in Sydney. Perhaps this is true. May I assure you of two things. Firstly, the Federal Executive reached the conclusion after a most careful examination of the problem, that a formal Constitution was an absolute essential, to establish the procedural validity of what we did, to enable funds to be transferred from one country to another, and to establish a framework within which we can work.

Remember, no "club" can exist except by virtue of its own rules.

Secondly, in propounding an Interim Constitution, we did not intend, as the Wireless Institute, to in any way impose ideas that represented the ideas of the Institute only on the other Societies involved. What we intended to do was to follow as precisely as we could, the somewhat broad decisions of the Congress, inserting such additional detail as was necessary. I believe that the document that has now been accepted, achieves this. If the first draft Constitution submitted did not, then this was the fault of the draughtsman, not of the Wireless Institute of Australia.

The significance of the adoption of this Constitution is considerable; it represents for the first time a precisely formulated area of agreement within the region—it is a great step forward to say that this soon, after the initial meeting of our Societies in Sydney in 1968, we have a formal association with detailed formal rules.

Let us not, however, underrate the difficulty of the adoption of a final Constitution. The divergence of fundamental views expressed in some of the correspondence to the Secretariat is considerable. The Directors at their next plenary meeting will face, I think, a far more difficult task than the task they faced in Sydney. Not only will agreement with a degree of precision be required, but it will be necessary to reduce this agreement to writing.

But now, having said that, can I also say this?

There are few organisations in my experience more constitution conscious than Amateur organisations. I note with some amusement that a concern for your own constitution is reflected in some of the pages of "Break In" during the last year. We, in the W.I.A., have devoted a quite unreasonable time to our own so-called constitutional problems.

Let us, in Region III., not devote a disproportionate part of our time and energy to our constitution. The constitution is only a framework. An organisation with the best constitution in the world cannot succeed without the right men both as its members and as its leaders. Organisations are people, not rules. Let us look to people, not words. Let us do a workman-like job with our own constitution, but let us not distort the importance of it.

It seems to me more important that we seek new members from the Societies in the Region, that we establish a means of communication such as a regional bulletin and that we generally further the objects of the I.A.R.U. throughout the Region. We, in the W.I.A., are now considering whether the next plenary meeting should not be held, next year, in 1970, rather than in 1971.

It seems generally recognised that there is a real risk of an I.T.U. Conference in late 1970—or more likely early 1971. What can our association do in terms of our region? I do not presume to answer that question—but I do suggest that if we are to do anything, we must think in terms of a meeting before such a conference.

Please forgive me for devoting so much time to the Region III. Association, but for us in Australia, this represents one of the most important dedevelopments in Amateur Radio in recent years.

We realise how easily it could fail. We believe, given N.Z.A.R.T. support, as well as the support of the other Societies in this great region, we can, in the long term, achieve more for the protection of Amateur Radio, and in particular for the protection of our frequencies by a Regional Society than by any other means.

In conclusion, may I now refer to the significance of my visit to this N.Z.A.R.T. Conference.

At Easter 1968, your President extended an invitation to the President of the W.I.A. to attend the Conference. Last Easter, the Federal Council of the W.I.A. considered whether or not the expenses associated with such a visit could be justified. I would be less than frank with you if I did not tell you that this question was given some anxious thought—as no doubt was the question of whether or not N.Z.A.R.T. would, itself, participate in the Region III. Congress in Sydney last year.

Like you, we considered that this sort of visit was a proper expenditure of our funds.

To me it is now obvious that this decision was absolutely right. I have been able to discuss Region III. matters with your officers. I have been able to talk about greater co-operation between our Societies in relation to our respective publications. "Break In" maintains a quality that surely would make it attractive to many Australians if it was readily available. I hope that many of you would think of subscribing to "Amateur Radio" if it was likewise readily available to you.

These are tangible things.

But New Zealand is our nearest neighbour. In terms of distance, in fact, you are no further from us than is Perth. Your country can boast of the highest number of Amateurs per thousand population in the world.

N.Z.A.R.T., J.A.R.L. and W.I.A. are, in terms of membership and resource, among the few really significant national Amateur Radio Societies in this Region and must therefore, be prepared to take the responsibility of leadership in the Region.

We just cannot afford not to have a real mutual understanding .

We cannot achieve this without personal contact—and as officers and ideas change, so that contact must continue.

Gentlemen, I shall go back to Australia and shall advise the Federal Council that in my opinion this visit has achieved much, both in terms of mutual understanding and tangible co-operation.

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PROVISIONAL SUNSPOT NUMBERS

APRIL 1969

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	156	16	144
2	143	17	155
3	143	18	148
4	122	19	128
5	101	20	124
6	78	21	122
7	82	22	90
8	77	23	72
9	90	24	81
10	85	25	81
11	92	26	78
12	91	27	78
13	122	28	72
14	139	29	60
15	140	30	63

Mean equals 105.2.

Smoothed Mean for October 1969: 109.6.

—Swiss Federal Observatory, Zurich.

New Equipment

AUDIO SIGNAL GENERATOR

The 'Rapar' Model A-1 audio signal generator is a ruggedly constructed instrument that will find many applications in the Amateur shack. Housed in a metal case with crackle grey finish, the instrument is fitted with a large vernier dial and has a flexible carrying handle.

Specifications.—Freq. range: sine, 20 cycles to 200 Kc.; square, 20 cycles to 30 Kc. Cal. accuracy: ±2% + 1 c.p.s. Output voltage: sine, max. 21v. p/p; square, max. 24v. p/p. Distortion: Less than 1% (at 20 Kc. and below). Tube complement: 12AT7, 12BH7A, silicon diode, thermistor. Power supply: AC 50 c.p.s. 230v. Trade Price $35.20 plus 15% S.T.

Further information from Radio Parts Pty. Ltd., 562 Spencer St., Melbourne, or their city depot and East Malvern branch.

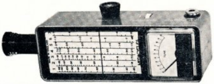
"GRID-DIP" OSCILLATOR

From Eddystone is a versatile, battery operated, solid state "grid-dip" oscillator with a wide range of functions. Named the "Edometer," the instrument performs as an absorption wavemeter, standard dip oscillator, heterodyne wavemeter, simple signal generator (modulated or unmodulated), modulation monitor, and audio signal source.

Used as a dip resonance indicator, the frequency coverage is from 1700 Kc. to 115 Mc., with two additional coils being provided for signal generation over the range of 390 Kc. to 1600 Kc. Normal "dip" operation is available at all frequencies above 1.25 Mc. (ranges 1-5).

Silicon transistors are used in both stages, the oscillator being a FET (Texas 2N3819), and the audio oscillator/amplifier a planar transistor (T1407).

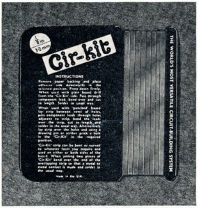
Constructed of light steel, with grey hammertone finish, the instrument is



housed with its seven plug-in coils in a handsome, dove-tailed jointed wood case, and is complete with instruction book. Price: $92.73 plus 15% S.T.

Further information from R. H. Cunningham Pty. Ltd., 608 Collins Street, Melbourne, Vic., 3000.

ADHESIVE COPPER STRIP



Branded "Cir-kit" is an adhesive backed copper strip designed for fast wiring of prototype equipment and servicing of printed circuit apparatus. Available in length of 100 ft. and 500 ft., widths of 1/8" and 1/16".

Further information from Zephyr Products Pty. Ltd., 70 Batesford Road, Chadstone, Vic., 3148.

FAIRCHILD POWER TRANSISTORS

Released by Fairchild is a series of six NPN power transistors, the AY8108 and AY8109 (20 watt), AY8110 and AY8111 (25 watt), and the AY8115 and AY8116 (6 watt). All silicon power transistors, these are the first of a new family from Fairchild to be made in Australia, and will be followed shortly by the release of two high speed switches, one a 300 volt 7 amp., and the other a 150 volt 5 amp.

Further details from Fairchild Australia Pty. Ltd., 420 Mt. Dandenong Road, Croydon, Vic., 3136.

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FAIRCHILD-ELCO AGENCY

Effective July 2, Fairchild Australia Pty. Ltd. announce their appointment as sole Australian agents for Elco Corporation, Pennsylvania, U.S.A. From this date, all enquiries for electrical connectors should be directed to Elco Customer Service Department, Fairchild Australia Pty. Ltd., 420 Mt. Dandenong Road, Croydon, Vic., 3136.

Technical Data

YAESU S.S.B. TRANSCEIVER

Model FT-200 s.s.b. transceiver for 80 metres down to 10 metres, operates from a separate 230v. a.c. power supply available as an extra. Cabinet is finished in grey lacquer and features a satin finished, etched front panel.

Specifications.—Emission: s.s.b., c.w., a.m. Input power: 240w. two-tone p.e.p. (s.s.b., c.w.), 75w. a.m. Freq. ranges: 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 Mc. Stability: after warm up, drift within 100 c/s. Output imped.: 50-120 ohms, unbalanced. Carrier suppression, better than —40 db. Sideband suppression, better than —50 db. Rx sensitivity: 0.5 uV. input, S/N 10 db. Selectivity: 2.3 Kc. (—6 db.), 4 Kc. (—60 db.). I.f. and image ratio: more than 50 db. Audio: output, 1w.; impedance, 8 or 600 ohms. Tubes and semiconductors: 16 tubes, 12 diodes, 6 transistors.

Price of FT-200, $345 inc. S.T. Imported matching power supply with speaker, $90 inc. S.T.

Further information from the factory authorised agents: Bail Electronic Services, 60 Shannon St., Box Hill North, Vic., 3129.

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CONVERTING THE AR88

(Continued from Page 7)

3. Mount a one-lug tag-strip on the screw and nut nearest to the front of the receiver on which the C48, C109, C110 block condenser is fitted.

4. Connect a 1 uF. condenser from the lug of the tag-strip to chassis.

5. Solder two insulated hook-up wires of about 15 inches long to the switch. One to the common contact, the other one to one of the two remaining contacts.

6. Twist the two wires all the way, as you do with filament lines, and pass them through the hole right in the corner of the chassis nearest the a.v.c.-a.v.c. n.l.-man. n.l.-man. switch.

7. Cut off surplus lengths and connect one of the wires to C48 (nearest to the front of the receiver). Connect the other one to the 1 uF. condenser on the one-lug tag-strip.

The modification is now complete except for re-peaking T9 (the final i.f. transformer) and for marking the a.g.c. slow-fast switch with Dymo tape. Knobs looking almost identical to the ones used on the AR88 are commercially available. They are made by a Japanese firm.

It is not a quick and easy modification, but it is well worth while and you will find that your AR88 is capable of giving a first class copy of s.s.b. signals just by the flick of a single switch.

If, after all this, it does not work, may I suggest that you buy a new receiver and throw your AR88 away . . . in my direction please. I will gladly take it! Good luck.

New Amateur Radio Satellite Group negotiating for Australis Launch

By RICHARD TONKIN, Chairman, Project Australis

Two years ago, in June 1967, the first Australian-built Amateur Radio satellite was loaded aboard a jet in Sydney, bound for San Francisco. With the satellite, named **Australis-Oscar A** (AO-A), travelled the hopes of a small group of people who had put over two years' part-time work into the design and construction of a 17 x 12 x 6 inch box which, it was hoped, would make a worthwhile contribution to Amateur Radio satellite technology.

Following the arrival of AO-A at Project Oscar headquarters in California, the satellite was checked out and attempts were made to secure a launch. Unfortunately, despite a lot of hard work by Project Oscar over the past two years, it was not possible for them to obtain a launch for AO-A.

On 3rd March this year, a new organisation was incorporated in Washington, D.C., with the aims of building and obtaining launches for Amateur Radio satellites. The new group is the Radio Amateur Satellite Corporation (AMSAT). AMSAT's members are drawn from such organisations as the Communications Satellite Corporation, the NASA Goddard Space Flight Centre, the FCC, RCA, NASA Headquarters, IBM, etc. AMSAT has the blessing and support of Project Oscar.

The AMSAT organisation hopes to build and launch advanced Amateur Radio communications satellites, with the emphasis on a sub-synchronous orbit such that the satellite would drift slowly around the equator at an altitude of about 20,000 miles. Such a satellite would stay in range of any one Amateur Station for about two weeks at a time and would make trans-Pacific VHF and UHF Amateur communications possible.

On 14th April, following agreement between Project Oscar, AMSAT and Project Australis, the AO-A satellite arrived at AMSAT's Washington, D.C., headquarters. At the present time, the satellite is being tested and evaluated by AMSAT and AMSAT is discussing with NASA the possibility of launching AO-A as a secondary payload on a NASA vehicle. We are hopeful that the satellite (to be named **Australis-Oscar** 5 in orbit) will be launched into a fairly low polar orbit later this year. AO-A will transmit seven channels of telementary on 144.050 Mc. (50 mW., continuous) and 29.450 Mc. (250 mW., on command). It is hoped that propagation measurements can be made by observing signals from the two transmitters. The satellite also carries a magnetic stabilisation system designed to partially stabilise it in orbit. The AO-A satellite has already been described in a previous issue* and a further description, including updated telementry calibration data, will be published in a forthcoming article.

Further information about the Australis-Oscar A satellite and the latest news about launching plans may be obtained from the State Oscar co-ordinators:—

Queensland: Laurie Blagbrough, VK-4ZGL, 54 Bishop St., St. Lucia, 4067.

New South Wales: V.h.f. and T.v. Group, 14 Atchison St., Crows Nest, 2065.

Victoria: Don Graham, VK3BAC, 38 Murray Drive, Burwood, 3125.

Tasmania: Peter Frith, VK7PF, 181 Punchbowl Rd., Launceston, 7250.

South Australia: Brian Tideman, VK-5TN, 33 Ningana Ave., Kings Park, 5034.

Western Australia: Kevin Bicknell, VK6ZBC, 48 Sanderson Rd., Lesmurdie, 6076.

Project Australis activities encompass a wide range of endeavour and include intrastate, interstate and overseas ground-based communications networks (both voice and RTTY), ground-based VHF and UHF translators and repeaters, administration, publicity, satellite tracking and data acquisition, fund raising, satellite transmitter, receiver, telemetry, command, stabilisation and power systems, satellite repeaters and translators, and so on.

The Project invites both Radio Amateurs and those who, while they may not be licensed Amateurs are, nevertheless, interested in the work that is being done, to participate in these activities. Membership of Project Australis is open to all interested individuals and groups, both within Australia and overseas. Write to Owen Mace, Secretary, Project Australis, 84 Bowen Crescent, Princes Hill, Victoria, 3054, for membership form and further details.

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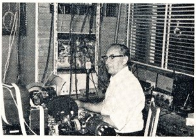
* Australis Oscar A User's Guide, "Amateur Radio," Feb. 1968, p. 3.
Australis Oscar A User's Guide, "Amateur Radio," March 1968, p. 10.

THE JOYS OF R.T.T.Y.

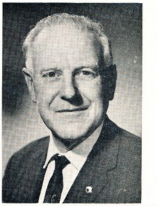
STARRING JIM VK3DM

The pictures tell the story far better than words could ever do.

Left: "What the hell has gone wrong?"
Below left: "The trouble could be here."
Below right: "Ah!! That has fixed it."



FRED BAIL OVERSEAS



Mr. Fred Bail, of Bail Electronic Services, is at present visiting Japan and the Far East. In Tokyo, Mr. Bail will call on their principals, the Yaesu Musen Co., to inspect their factory and laboratory and the latest techniques in construction, testing, etc., of Yaesu s.s.b. equipment.

He will return to Australia via Hong Kong, Bangkok and Darwin early this month.

Overseas Magazine Review

"CQ"

February 1969

"CQ" was apparently held up in the mail or the issues were running a little later than "QST" and "73". This month we have February and March issues to review.

Introduction to IC Logic, F. B. McWilliams. Complete with lots of diagrams, the author discusses computer type logic. He attempts to rectify deficiences in Amateur knowledge by describing the circuit elements and building blocks of binary logic. A logic pulser and sine to square wave converters are described as novel construction projects.

Variable Frequency Tuner for the Visible Light Band. W4AML continues the series begun in January "CQ". In this issue he describes the construction and calibration of the monochrometer that can be used to tune across the light band.

Put Up Your Beam To Stay, W6BLZ. Ed has apparently been worried by the elements at his Coastwise location causing corrosion of his beam elements and found that the best solution was a coating of PVC electrician's tape. (Perhaps shrink fit tubing would work just as well and not require so much winding and unwinding?)

The W8NWU Teeter Tootter Tuners, W2EEY-/1. John says that following on from his article on T networks in "CQ" May '68 he had correspondence with various Amateurs who developed T network designs. One of the most interesting was W8NWU's series of tuners which added variety to the theme.

Measuring Power Input and RF Power Output, D. P. Smith. As modulation waveforms become more complex, perhaps some day including digital forms, one's view of power measurements requires a more generalised approach in order to avoid confusion.

Two Weeks in a Goldfish Bowl, Sylvia Margolis. In her usual racy fashion, Sylvia tells the story of GB2LO.

Co-axial Cables: S.W.R. Readings, Testing and Installation, W2EEY/1. The s.w.r. indicator at the transmitter never indicates the exact s.w.r. between the transmission line and antenna. Most often, however, the reading is close enough to be useful. This article explores what can cause erroneous s.w.r. readings on co-axial lines and how such lines can be tested and installed to prevent problems in them.

An Audio Limiter Circuit, WB4CVF. Described here is a distortion free limiter circuit capable of handling a wide dynamic range. Originally intended for r.t.t.y. use, the addition of a pre-amplifier has made it suitable for low level inputs.

Vertical Antennas, W3JM. Part IX. of a series, discusses a simple directional array which can be built in an equilateral triangle form and which gives a gain of 5.2 db. when using any two elements. (Looks interesting.)

The Galaxy R-530 Solid State Receiver. W2AEF reviews this new production. (It looks like quite a block diagram and if the receiver performs as well as the review suggests, then even at the Australian price it would be well worth while.)

March 1969

"Please Don't Call It A Transceiver." The adv. on page 11 is headlined and a new company called Signal One announces the arrival of its brain child which they have dubbed an "Integrated Station". Their CX7 seems to be crammed with goodies like nixie frequency readout, two v.f.o.'s built in, electronic keyer, etc., etc. They do not tell the reader what the price is. From the mouth watering advertising line, I have no doubt that it will out Collins by a considerable margin.

The Voice of Apollo 8, K4DSN writes about the communications system used to back the moon flights which are very topical right now with Apollo 10 in orbit around the moon as I write.

A Phase Modulator for Crystal Controlled VHF Transmitters, W6AJF. Thirty years ago I used to lap up the writings of Frank C. Jones who was famous for his "Super Gainer" receiver designs. He has converted himself to solid state and in this article describes a very useful device with an 8 Mc. output for multiplying into the v.h.f. region.

Two Weeks in a Goldfish Bowl. Sylvia Margolis concludes the story of GB2LO commenced in the February issue.

Communicating Through Moonray, WA2QMC. Nick Marshall, W6OLO, President of Nastar, was formerly Technical Director of the Oscar programme and he and the group are preparing submissions for Nasa to transport a five-pound weight 432 Mc. translator to the moon in the third Apollo/LM lunar mission in the early 1970s. Details of the requirements are given for all sections of a working circuit. It appears that communicating via the translator will be a cinch for VK3ATN with his 30 ft. dish as the minimum is stated to be a 10 ft. dish.

How About a Mini Transmitter Hunt, W9IWI. Describes very simply made transmitters to be hidden in a room and sought out using a b.c. band transistor radio. The author states that his unit is 3/8 x 1-1/8 inch and has a range of a "foot or two".

The 2 & 2 Dial for the HW-100. WA8ASQ considers that Heath's new all-band low-priced transceiver is definitely lacking and with some Jackson and Swan parts from Swan, he does something about it. (Perhaps Swan are not too happy to find their spares being used to modify a competitor's product, or maybe they are complimented.)

Vertical Antennas, Part X, W3JM. This month Capt. Paul Lee discusses how a folded unipole antenna less than a quarter wave long can be used to transform the low input resistance of a short vertical antenna to a resistance which is more reasonable to match and drive. The author further discusses the operation and design of the folded unipole antenna in this installment.

A Home-Made Slot Antenna for 432 Mc. by K4ZQR. Just what it says.

"CQ" reviews the **Paxitronix IC-3 Frequency Divider** for 25 Kc. markers and the **Caringella Compressor/Pre-amplifier, Model ACP-1,** by W2AEF.

"RADIO COMMUNICATION"

March 1969

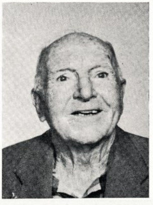
Portable on Slieve Donard. GI3VJS describes how a group of Amateurs lugged a 4 mx station up to the top of a 2,796 foot mountain to attain contacts from some 300 kM. away. (Australian weather is kinder than that in Northern Ireland.)

A Single Sideband Transverter for 144-146 Mc. G3LUB describes a tube unit with a QQV06/40 in the output with 650 volts on the anodes.

Technical Topics by G3VA. Pat Hawker offers his usual interesting dissertation on the technical articles which have appeared recently in a number of publications. He covers some more cures for t.v.i., transistor frequency divider, a.f. filters, and a high gain JFET voltmeter.

Using the QRA Locator, A. J. Gould. The QRA locator is a system used in Europe for the rapid exchange of location information between v.h.f. stations.

As Steady as a Rock, G3JGO. Describes the operation of several types of crystal oscillators as well as the basic theory behind all oscillators. Valve and transistor circuits are shown.



JOE KILGARIFF, VK5JT

Joe, who celebrated his 83rd birthday on 3rd May, 1969, is believed to be one of the two oldest active Amateurs in Australia.

Whilst we do not have full details of his equipment, we do know he runs 100 watts and uses a TA33. His receiver is an AR88.

We wish him many more years of happy DX hunting.

"SHORT WAVE MAGAZINE"

Marchr 1969

Variations on the Vertical, G8PG. Describes the means of adapting a 33 ft. system two-band coupler for the h.f. bands.

Making Cabinets for Home-Built Gear, G3REM. Describes the simple tools and equipment one would expect an Englishman to use to make his cabinets.

More About the No. 19 Set, G3TKR. Despite its age, this type of transceiver is still very useful for work on 160 and 80 metres. This article describes a conversion which could probably be applied to Australian number 19s. Some of the ideas could be of use in the later ex-Army sets also.

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Book Review

RADIO AMATEUR'S HANDBOOK

For many years, the A.R.R.L. Handbook was like a well known small motor car. All changes and improvements were gradually made over a long period of time. However, in the last few years, the A.R.R.L. have changed their policy, and the 1969 edition of this Handbook, which has been published continuously since 1926, has more changes and improvements than probably any other issue.

The theory sections, which are used as standard manuals by many others than Amateurs, have undergone considerable revision, and much more emphasis has been placed on solid state devices, including dual gate MOSFETS, solid state product detectors, and transistorised oscillators. Numerous brand-new construction projects have been included. Among them are such items as universal-type power supplies for all voltage ranges from 3 to 1,000. Solid state transceivers have been added. Transmitting and transceiving converters for s.s.b. are described, and transmitting equipment for the 160 metre band has been added. Treatment has also been given to v.h.f. f.m. repeater stations and satellite communications.

Regardless of whether you are a beginner or an Amateur of many years standing, this book is a must on your bookshelf.

The review copy was supplied by the A.R.R.L.

V.H.F. COMMUNICATIONS

Published by Verlag UKW-Berichte, West Germany. Soft paper cover 6 x 8½ inches, 64 pages.

The first edition Feb. '69 represents the beginning of a new Amateur Radio magazine, devoted entirely to v.h.f.-u.h.f. and microwaves. It is essentially the English version of the German Amateur Radio magazine UKW-Berichte and will be useful to the group of Amateurs working in the frequencies of 144 Mc. and above.

It is interesting to note that this magazine is written in the fashion of a technical publication rather than in the more common form directed at the local Amateur scene. Its international market probably accounts for the absence of advertisments, club news, DX notes, etc., and has allowed the contents to be entirely devoted to providing instructions for building transmitters, receivers and test equipment. Towards this end, the publishers claim that printed circuit boards and special components mentioned in the articles will be available through the Australian distributors, but one ponders the cost and delay that must be incurred due to importing such items.

The technical articles in this first edition deals with the construction of a 2 metre converter and compares the performance with the commercially made units, the construction of a phase locked oscillator, a 144/432 Mc. low power transverter and antennae for v.h.f.-u.h.f. One notable highlight is an article written by R. Lentz, on a solid state converter for 1296 Mc. A clearly written article with excellent coverage of the electronic and construction details of the co-axial tuned cavities. The diagrams of the metal work are easy to follow, provided that you remember all dimensions are in millimeters.

A well written magazine to be recommended to all interested in v.h.f. techniques, and a notable addition not only to the libraries of those experienced Amateurs operating in this portion of the spectrum, but also to those commencing their activities as limited operators in the v.h.f.-u.h.f. bands.

Our copy was received from the Australian representative, 2 Beaconview St., Balgowlah, N.S.W., 2093.

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

I guess it is not very often that an S.w.l. compiles the DX page for an Amateur Radio magazine, and I trust I am able to do the job in the manner of my more capable predecessors. We will continue with the present format, however I would appreciate any assistance other members can give me, not so much with DX worked, but with items of general interest. My postal address is P.O. Box 222, Penrith, N.S.W., 2750. I am on the staff of the Penrith Post Office, where I can be contacted at Penrith 20660, home phone is Springwood 511364. Finally, I can be contacted by tape using twin track 3¾ i.p.s.

Information for this issue is per courtesy of International Short Wave League (England), Newark News Radio Club (U.S.A.), Geoff Watts (U.K.), George ZL2AFZ, Larry DX1AAV, George L6042, Mac Hilliard, Steve L5088, Jack VK3AXQ, Long Is. DX Assn., GC8HT, W2GHK.

HERE AND THERE

Further news on the DU call signs comes from DX1AAV. Only three DX calls were issued, they were DX1HMI, DX1BJ and DX1AAV. It appears that W and DU are about to sign a reciprocal agreement, and all calls issued will be in the DU1ZAA series, the DX prefix being retained for use by the DU gang for expeditions.

GC8HT on Guernsey supplies his sked information and QSL particulars. For VK, send direct to home QTH: Richard H. Taylor, La Coure de Longue, St. Saviour's, Guernsey, C.I., enclosing SAE or IRC. Cards via the bureau will be overstamped "confirmed by GC8HT" and returned.

List of DX worked and heard by Jack VK3APN is really outstanding, however he missed out on a beautiful contact with PA0RIH who was 599 and out in the open, when his power supply blew up.

Did you notice during the Heard Is. operation of VK0WR, an adjacent operation by UA0WR? Made things somewhat confusing for a while. Whilst on the subject, UV0ED and EX are both Sakhalin Is., Zone 19, UA0EH also Zone 19, whilst UA0YE is in Zone 23.

CR8AG has been reported active from Portuguese Timor, using a 25 watt a.m. signal.

Frank VK2QL, writing in the VK2 Divisional Bulletin this month, mentions an incident whereby Karl VK2BKM was approached by a would-be QSL manager from Italy whose main interest seemed to be how much the task would be worth to him. This happens, however there are many sincere chaps who would take on the task of QSL manager for a DX station, and Arther Miller, 62 Warwards Lane, Selley Oak, Birmingham 29, England, who is editor of "Monitor," has a list of these persons. A letter to him will assist anybody who needs assistance with their QSL chores.

Recent visitor to this country was Jack Dale, WB2TIU, of New Jersey. Jack is a radioman on the "African Star" and well known in v.h.f. circles in that area.

160 metres has dropped off in VK6 from a DX point of view, however George Allen, L6061, has logged several VK3s on that band, namely 3CV, 3AUJ, 3ARL, 3AXH?, 3ACA, 3ACH and 3GU. George has offered to supply these chaps with further particulars if they are interested. 283 Amelia St., Balga, W.A., 6067, is his QTH.

VS9MB again active with Brian G3XGY as operator. He has not been active on 80 mx, and the operator using this call since the departure of Malcolm last September is a pirate.

Further on the YB0 situation. YB0AAC, K3JJG/YB0, AAE and AR have been reported, and I heard YB1BC with a 599 signal on 20 early in May. Time was 1400z. Any information on this operation would be appreciated.

Cards for 7G1CG have been delayed, but Carlo intends mailing his logs to manager WA3HUP when he leaves at the end of May.

Cards for PA0MM, CX2CO, PY2PA, PY2PE and GD6UD, the latter for operation by Cambridge University from Mar. 17 to 24, are being processed by DX-pedition of the month, Box 7388, Newark 07107, N.J., U.S.A. A reminder on QSL procedure for this group may be in order at this stage. All QSLs to above address and all replies are sent via the return bureau unless return postage is supplied.

I note, too, a reminder from Dick GC8HT re writing the name of the month in QSLs. Many countries, particularly U.S.A. and Russian operators, when using figures reverse the position of the date and month, thus we date a card 3/11/69, they read it as March 11, can't locate it in the log and have to take valuable time in searching or else return the card as incorrect. S.w.l.'s are unfortunately offenders in this matter.

Bob Lane, G5AAM, who operated under the DX-pedition of the month banner last year and gave us some good call signs, has now returned to the States.

Surface mail embargo imposed on the Eastern States of America has been lifted, and their QSLs should be coming through.

Gus W4BPD has chartered a boat from 7th June for Algalea, Farquahar, Wizard Reef, Aldabra, Glorieuses (if licensed), Geyser Reef, and Madagascar, where he expects to arrive mid-July. He will operate /MM between stops and "reef" operation will depend on the wx.

3A2CL and EE will be operating May 25 and 26, QSL via F9RM.

1N2A ops. made 500 QSOs from Marco, and will return for further operations if the A.R.R.L. grants separate status; QSL to W4VPD.

Looking for 5R8? Try 5R8AN on 14270 s.s.b. at 0430 or 21335 0400z when in sked with QSL manager who is K4IE.

Operation by DU2NSJ on May 10-18 was the National Scout Jamboree, also DU0DM on May 20-June 1 was the annual expedition to Corregidor.

Who said a.m. died? Eskil Eriksson, who is most likely the highest scoring S.w.l. in the world with nearly 330 countries heard, recently heard three new ones, all on a.m.

Probable operation from Navassa by WB6HBK and IWS if permission granted. Transport has been arranged for mid-June, with later operation from KB6, KP6 and VR3.

QSL DETAILS

Bernard Hughes, of the I.S.W.L., sends the following list of stations who can be QSL'd through the I.S.W.L. Bureau at 87 Dunnington Rd., Wootton Bassett, Swindon, Whilstshire, England. HL9HQ, HS1TA, FP8AS, KP4BJD, KS4AAZ, KP4AZN, MP4BCU and BCV, MP4-TBO and TBU, PJ3AO, TG9EP, VP2AB, VP3AA, VP5RS, VP7CC, ZD8CC, YS1JL, XE1YG, XE-2BM, XE0GFJ, QDC and RZW, VP7NQ, VQ8AD, VS6EC, 9V1LP, 9K2AY, 9J2BC, 8RIP, 9M4MV and 9L1TL.

From "Monitor" a run-down on the YAs.

YA1AB—Chas Bennett, C/o. Pan American, Box 76, Kabul, Afghanistan.
YA1DAN—E. Daniels, U.S.A.I.D., U.S. Embassy Mail Room, Kabul.
YA1EKZ—C. Green, U.S.A.I.D., Illinois Uni., C/o. U.S. Embassy Mail Room.
YA1GNT—Ed Popko, Pan American, Box 76, Kabul.
YA1HD—H. Decker, Box 389, Kabul.
YA1KO—H. Koski, Harza Eng. Grp., U.S.A.I.D., Kandahar, C/o. U.S. Embassy.
YA1YB—Wes Baldwin, U.S.E.T./U.S.A.I.D., Embassy Mail Room, Kabul.
YA1ZA—G. Craig, Robt. Nathan Assc., U.S. A.I.D., Embassy Mail Room.
YA1ZC—John Wallace, U.S. Eng. Team, U.S. A.I.D., Embassy Mail Room.
YA2HWI—P. Larger, U.S.A.A.I.D./Sth. Ill. Uni., U.S. Embassy Rail Room.
YA5RG—Wolfgang Renner, Box 279, Kabul.
C2JW (ex VK9RJ)—R. Wirth, C/o. O.T.C., Nauru Is., Central Pacific.
CE8AA—A. Nielsen, Cas 464, Punta Arenas, Chile.
DX1NY—B. J. Smith, C/o. S.E.A.C.R., A.P.O. San Francisco 96274, U.S.A.

It is essential to use the zip code on all mail to the U.S.A., particularly those C/o. A.P.O.'s., there are many different zip codes shown care of A.P.O. San Francisco, and if the number is omitted, the card is returned to the sender.

QSL MANAGERS

CE9AT—CE3ZN.	HU1P—WB4BOJ.
CE0AJ—DL9KRA.	HB0AFM—HB9AFM.
CR3KD—WA4PXP (ssb) W2CTN (cw)	HB0GJ—HB9GJ. JZ5CI—W2CTN.
CR6KT—W3HNK.	KS6CX—K4ADU.
CR6LF—W3HNK.	MP4BGX—G3XHE.
CT6AW—DJ2IB.	OY2A—DL7FT.
DU1ZAG—WB6GFJ.	PJ2CC (for Mar. 21 to Ap. 2)—W1BIH.
EA6BG—DL7FT.	PY0RE—PY1HX.
EP2FD—WA5ERS.	WA6QGW/PX—K6VVA.
EP3AM—W3GJY.	ZL3ABJ/C—W5BRO.
FG7XT—K5AWR.	
GB2DCF—G3KQB.	

AWARDS

Afghanistan Award is issued for working YA stations from Jan. 1, 1966. Asian stations need four YA's, Africa and Europe need three, other continents need two, in all cases at least one must be on a different band. QSLs plus a dollar or 10 IRCs to YA5RG, Box 279, Kabul.

Malaysian Award.—You need ten 9M2, ten 9V1, one VS5, one 9M6, also one 9M8. Check list to Box 777, Kuala Lumpur, Malaysia.

Apollo Special Event Certificate.—Awarded by Kennedy Space Centre A.R.S. for QSOs made during each manned Apollo space mission (presumably with club members). Club operates on 3975, 7275, 14340, 21340 s.s.b., and 21100-250 c.w. Operation begins at time of Saturn V. space booster lift off, and continues for about 10 hours. QSL and IRCs to WB4ICJ, P.O. Box 21073, Kennedy Space Centre, Florida, 32815.

LATE FLASH

Thor Heyerdahl, who hopes to cross the Atlantic in a reed boat, will be using the call LI2B, and will be QRV on 20 metre phone.

SUMMARY

Having been away in VK4 for the past two weeks, I have done little listening, however from various reports, in particular Mac Hilliard over in Campsie, it would seem that conditions are on the wane. Mac reports 10 is out, but much more early morning activity on 40 c.w. from Europe. I heard some good signals on 80 c.w. about 4 a.m. local time a few days ago. George ZL2AFZ reports the predictions for June and July are 91 and 90, with January confirmed at 104 against 100 predicted.

73, Don L2022.

CONTEST CALENDAR

5th/6th July: R.S.G.B. 1.8 Mc. Contest.
5th/6th July: N.Z.A.R.T. Memorial Contest (3.5 Mc. only).
16th/17th August: Remembrance Day Contest.
23rd/24th August: All Asian DX Contest (J.A.R.L., c.w. only).
4th/5th October: VK/ZL/Oceania DX Contest 1969, Phone Section.
11th/12th October: VK/ZL/Oceania DX Contest, 1969, C.w. Section.
11th/12th October: R.S.G.B. 28 Mc. Telephony Contest.
25th/26th October: "CQ" W.W. DX Contest, Phone Section.
25th/26th October: R.S.G.B. 7 Mc. C.w. Contest.
9th November: International OK DX Contest (c.w. only).
29th/30th November: "CQ" W.W. DX Contest, C.w. Section.
6th December, 1969, to 11th January, 1970: Ross A. Hull Memorial Contest.
1st/2nd February, 1970: John Moyle National Field Day.

HELVETIA XXII.

In order to create a healthy emulation between its members and to intensify the contacts with foreign Amateurs, the U.S.K.A. donates a diploma, **Helvetia XXII.** This diploma is attributed to foreign Amateurs who certify having contacted once each Swiss canton.

To be valid, these contacts should be made on c.w. or phone (mixed QSL are acceptable), exchanging the RS (T) and QTH. Foreign Amateurs are to submit 22 QSL cards, i.e. one for each canton.

This regulation is in force as from 15th April, 1948. Any QSO made prior to this date is not valid. No delay has been fixed to realise this performance.

The following is a list of Cantons to be contacted:

1. Zurich	ZH	12. Schaffhouse	SH
2. Berne	BE	13. Appenzell	AR
3. Lucerne	LU	14. St. Gall	SG
4. Uri	UR	15. Grisons	GR
5. Schwyz	SZ	16. Argovie	AG
6. Unterwald	NW	17. Thurgovie	TG
7. Glaris	GL	18. Tessin	TI
8. Zoug	ZG	19. Vaud	VD
9. Fribourg	FR	20. Valais	VS
10. Soleure	SO	21. Neuchatel	NE
11. Basel	BS	22. Geneve	GE

Address for awards: U.S.K.A. Award Manager, Henri Bulliard, HB9RK, P.O. Box 384, 1701 Fribourg, Switzerland.

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

Not much in the way of general news this month, but would like to appeal to Divisional Secretaries again for the dates of the Divisional meetings and V.h.f. Group meetings, as I am always getting requests for this information.

I would also like details of the MAIN net frequencies and the Translater frequencies that are to be used.

Well that's all for now, 73 Cyril VK3ZCK.

VICTORIA

This month (May) lacks any DX of note, but making a welcome appearance again on two metres after a long break while re-building is Allan VK2ZEO, who resides in the southern N.S.W. town of Deniliquin. Allan can be worked almost nightly by Melbourne stations and has a very healthy signal. Another signal which can be heard occasionally is the Albany beacon VK6VF/P. This signal can be heard via Meteor scatter, and because of its permanent emission and its location, is one of the few that can be heard by this media.

432 Mc. is still a very popular band in VK3 and should have an increased population before very long. The following is a list of the boys in this State who are equipped to operate two-way on this band: VKs 3AUX, 3BAS, 3AKC, 3ZBZ, 3AGV, 3ZPU, 3ZSJ, 3ZYO, 3ATY, 3ZBJ, 3ZHW, 3ZYT, 3ZEO, 3ABP, 3AY and many more who only transmit or who can only receive.

Les VK3ZBJ and Ron VK3AKC have been experimenting on 1296 Mc. between shacks which are about 40 miles apart, and are having most encouraging results. Signals have been around the S5 to S9, but experiments were cut short when Ron was taken ill and is now taking an enforced rest. Best wishes Ron and we all hope that you are back on deck again soon.

Over the Queen's Birthday week-end a large gathering of Amateurs from VK5 and VK3, together with their YLs, XYLs and harmonics, attended the South-East Radio Group annual convention at Mount Gambier. A very good time was had by all. Fuller details in next month's "A.R." 73, Peter VK3ZYO.

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NEW CALL SIGNS

MARCH 1969

VK1NR—J. B. Scott, 39 Empire Circuit, Forrest, 2603.
VK1WA—W. A. Bell, 27 Guilfoyle St., Yarralumla, 2600.
VK2HI—N. A. Jeffery, Christian Bros. School, Church St., Wagga Wagga, 2650.
VK2KR—K. C. Mattei, 174 Kissing Point Rd., Turramurra, 2074.
VK2MK—E. C. Sloss, 205 Deepwater Rd., Castle Cove, 2069.
VK2BJM—J. R. Martin, 114 Iluka Rd., Palm Beach, 2108.
VK2BMW—M. F. Wiedyk, 290 Forest Rd., Kirrawee, 2232.
VK2BNM—N. C. McMillan, 3 Long St., South Strathfield, 2136.
VK2BRB—R. L. Close, Station: C/o. W. Connick, Goodnight, 2739; Postal: P.O. Box 8, Goodnight, 2739.
VK2BTB—T. S. Barnett, 20 Elizabeth St., Fairy Meadow, 2519.
VK3FC—F. T. Clark, 4 Carroll St., Leopold, 3221.
VK3QF—P. J. Dettman, 45 Hutton St., Kyneton, 3444.
VK3AAK—H. A. McLachlan, 1521 Heatherton Rd., Dandenong, 3175.
VK3AEJ—G. W. Brain, Federal St., Rainbow, 3424.
VK3AJU—H. Jupp, 20 Webster St., Dandenong, 3175.
VK3AMA—T. J. Van Staveren, 18 Agnew St., South Blackburn, 3130.
VK3AMO—R. L. Warnecke, "The Springs," Merricks North, 3926.
VK3APL—A. Campbell-Drury, 10 Colchester Dr., East Doncaster, 3109.
VK3ARI—J. W. Hart, 171 Henty St., Reservoir, 3073.
VK3ASE—L. E. Martin, Flat 8, 245 Warrigal Rd., South Oakleigh, 3167.
VK3ASO—Midlands Experimental Radio Group, Bendigo Institute of Technology, Macrae St., Bendigo, 3550.
VK3ASU—St. Paul's College Radio Club, Chambers and Blackshaws Rds., Altona North, 3025.
VK3AXM—L. De Vries, 167 Lloyd St., Moe, 3825.
VK3AXN—A. G. Thornton, "Yaralin," Kangaroo Ground Rd., Warrandyte, 3113.
VK3AXQ—J. R. Dunne, 13 Hanlon St., Tatura, 3616.
VK3AYB—J. A. Robb, 2 Wemberly Crt., Glen Waverley, 3150.
VK3AZI—G. P. Chamberlain, 17 Glenda St., Doncaster, 3108.
VK3AZQ—P. Broughton, 9 Andrews St., Burwood, 3125.
VK3AZU—D. M. Laws, 102 Mimosa Rd., Carnegie, 3163.
VK3ZCF—J. G. Telfer, 40 Lucerne Cres., Alphington, 3078.
VK3ZCV—C. J. Chippindall, 7 Morack Rd., Vermont, 3133.
VK3ZDD—R. V. Reid, 17 Norman St., East Doncaster, 3109.
VK3ZDW—I. W. Cowan, Flat 2, 41 Melrose St., North Melbourne, 3051.
VK3ZHQ—B. P. Kreymborg, 7 Sir Garnet Rd., Surrey Hills, 3127.
VK3ZKK—D. R. Riglar, 12 Palmerston Crt., Greensborough, 3088.
VK3ZKY—T. Johnson, 34 Kathleen St., East Preston, 3072.
VK3ZKZ—D. V. Hambleton, Flat 8, 134 Neerim Rd., Carnegie, 3163.
VK3ZLA/T—H. H. Chittock, 11 Little Myers St., Geelong, 3220.
VK3ZLF—V. P. Hunt, 18 Rose St., Box Hill, 3128.
VK3ZMV/T—H. A. Kellock, Flat 10, 7 Kenilworth Pde., Ivanhoe, 3079.
VK3ZNC—G. D. Kuck, "Ramanyuck," Perry Bridge, via Stratford, 3862.
VK3ZNR—E. J. Haydon, 550 Pascoe Vale Rd., Pascoe Vale, 3044.
VK3ZOA—A. J. Wighton, 6 Marcella Crt., Glen Waverley, 3150.
VK3ZOJ—A. W. Taggard, 31 Nisbett St., East Reservoir, 3073.
VK3ZOL/T—B. L. Young, 6 Stockdale Rd., Traralgon, 3844.
VK3ZPO—T. M. Porritt, 10 Morden Crt., Nunawading, 3131.
VK3ZQU—B. T. Dingle, 13 Theodore St., Bendigo, 3550.
VK3ZQX—P. R. Rodeck, 137A Mont Albert Rd., Canterbury, 3126.
VK3ZSN—W. Chandler, 48 Noble St., Newtown, 3220.
VK3ZSQ—C. E. Middleton, Flat 3, 1A Ross St., Bentleigh, 3204.
VK3ZTA—D. J. Laidlaw, 5 Kyle Ave., Belmont, 3216.
VK3ZTT—V. Alilou, 6 Grandview Ave., Maribyrnong, 3032.
VK3ZUJ—B. S. Jarrett, 103 Tucker Rd., Bentleigh, 3204.
VK3ZVI/T—I. C. Batty, 327 Banks St., South Melbourne, 3205.
VK3ZVP—R. A. Rhone, 485 Bluff Rd., Hampton, 3188.
VK3ZVV—R. D. Miller, Flat 6, 234 Nicholson St., Abbotsford, 3067.
VK3ZWG—P. M. Simpson, 5 Laurence St., Glenroy, 3046.
VK3ZYF—C. J. Holliday, 30 Gardenia St., Blackburn, 3130.
VK3ZYY—A. M. Goode, 92 Mont Albert Rd., Canterbury, 3126.
VK3ZZL—G. M. Strickland, 61 Glenoreme Ave., Ormond, 3204.
VK3ZZV—G. Fella, 8 Hilton St., Glenroy, 3046.
VK3ZZX—G. J. Zimmer, 12 Munro St., Malvern, 3144.
VK4DQ—B. V. Stockwell, 1 Jimbour St., Eagle Junction, 4011.
VK4LI—E. R. Lundquist, 32 Marshall Lane, Kenmore, 4069.
VK4QY—K. B. Pounsett, Flat 3, 12 Bouchard St., Chermside, 4032.
VK4TI—T. W. A. Halley, 1/24 Tarcoola Cres., Chevron Island, Surfers Paradise, 4217.
VK4TZ—A. E. Taylor, Officers' Mess, R.A.A.F. Base, Townsville, 4810.
VK4YZ—W. H. M. Hoyle, 21 23rd Ave., Mt. Isa, 4825.
VK4ZBO—A. R. Tarbit, Station: Mt. Nebo, 4520; Postal: P.O. Mt. Nebo, 4520.
VK5PI—G. Preston, 413 Montague Rd., Modbury, 5092.
VK5QC—W. H. J. Francis, 19 Morphett Rd., Camden Park, 5038.
VK5VJ—I. B. Werfel, 23 West Tce., Ardrossan, 5571.
VK5ZDU—D. R. De Cean, 2 Danby St., Torrensville, 5031.
VK6PD—Western Aust. Institute of Technology Amateur Radio Club, Hayman Rd., Bentley, 6102.
VK6ZEU—V. Mathews, Lot 169, Mereworth Rd., Thornlie, 6108.
VK7ZWD—D. Whent, 14 Kurrajong St., Grassy, **King Island**, 7256.
VK8ZBQ—B. R. Williams, Station: Flat 17, 92 Smith St., Darwin, 5790; Postal: C/o. H.F. Broadcast Project, P.M.G. Department, Box 2562, Darwin 5794.

CANCELLATIONs

VK1KM—K. C. Mattei. Now VK2KR.
VK1PI—W. L. Pitts. Deceased.
VK2CA—R. M. Harnett. Not renewed.
VK2KP—A. Fox. Deceased.
VK2RL—A. R. Litchfield. Not renewed.
VK2AFE—A. Magennis. Deceased.
VK2AXZ—W. A. Bell. Now VK1WA.
VK2BAP—V. L. Shillcock. Ceased operation.
VK2BJP—J. Pernu. Not renewed.
VK2BNR—J. B. Scott. Now VK1NR.
VK2BRD—R.A.A.F. (Richmond Amateur Radio Club). Ceased operation.
VK2ZNI—N. A. Jeffery. Now VK2HI.
VK2ZNL—R. N. Lee. Transferred to T.P.N.G.
VK2ZNW—W. Nicholl. Deceased.
VK2ZSI—R. L. Close. Now VK2BRB.
VK2ZSZ—D. T. Stevens. Transferred to S.A.
VK3LJ—J. P. Baker. Transferred to Qld.
VK3MA—W. R. Edwards. Transferred to Northern Territory.
VK3XO—L. A. Paul, Deceased.
VK3APJ—P. J. Dettman. Now VK3QF.
VK3ATR—T. B. Rodda. Transferred to Qld.
VK3ZSS—L. De Vries. Now VK3AXM.
VK3ZTC—A. N. Richardson. Transferred to Tas.
VK3ZVT/T—D. S. Thomas. Transferred to Canberra.
VK4HS—H. G. Scott. Deceased.
VK4ID—I. G. Dawson (Rev. Fr.). Transferred to W.A.
VK5GU—G. B. Hunt. Ceased operation.
VK5QT—H. F. Treharne. Deceased.
VK5SE—J. L. Schuler. Not renewed.
VK5ZBQ—B. R. Williams. Now VK8ZBQ.
VK5ZIW—I. B. Werfel. Now VK5VJ.
VK6DF—M. A. T. Du Feu. Not renewed.
VK7KC—L. Cordell. Transferred to Qld.
VK7ZFB—B. A. Butler. Transferred to Vic.

AMATEUR FREQUENCIES:
ONLY THE STRONG GO ON—SO SHOULD A LOT MORE AMATEURS!

1969 B.A.R.T.G. CONTEST RESULTS

No.	Call Sign	Points	Contin-ents	Diff. C'tries	Total C'ntacts
1	W2RUI	64,800	4	23	118
2	G3MWI	60,320	4	20	128
3	I1KPK	59,136	4	20	125
4	SM4CMG	49,680	3	18	108
5	VE7UBC	45,252	4	18	95
6	WA6WGL	44,814	4	18	87
7	W9HHX	41,664	4	17	128
8	VE2HL	34,216	3	16	67
9	I1CQD	31,326	4	16	61
10	DL5PQ	30,636	4	16	58
11	W5VJP	29,964	4	16	133
12	K2KFV	29,856	4	15	66
13	VK3NR	29,568	4	16	64
14	I1RRE	28,350	3	16	79
15	XE1YJ	28,260	4	10	77
16	I1KFL	22,952	4	16	48
17	SM5CLW	22,640	4	14	38
18	W2DIZ	20,824	4	15	36
19	I1EVK	19,532	3	14	46
20	W8CAT	18,942	3	13	51
21	K4VDM	17,918	4	12	31
22	PA0GKO	17,884	3	15	46
23	VE3RTT	17,490	4	9	39
24	K1GYF	17,366	3	12	45
25	VE6MM	14,952	4	9	47
26	DJ8BT	13,860	3	12	39
27	HB9P	13,022	2	13	39
28	WA8IQZ	12,992	3	13	34
29	WB6JSY	12,974	4	9	43
30	W6FFY	11,676	3	10	37
31	G3IYG	11,570	3	11	29
32	KH6GLU	11,070	4	9	43
33	SM0KV	8,944	2	10	32
34	W6AEE	8,808	3	7	23
35	ZL2ALW	8,016	4	8	21
36	OZ6OB	7,920	2	10	26
37	W0HAH	7,680	3	8	32
38	I1LCF	7,110	3	9	19
39	W2HAJ	6,696	3	9	20
40	W9CTX	6,462	3	9	23
41	VO1EE	5,440	2	7	28
42	ZL2AFE/3	5,072	2	6	25
43	F3PI	4,992	2	8	23
44	HA5FE	3,618	1	9	21
45	WA6TLA	3,348	2	3	35
46	DJ9XB	2,150	1	4	23
47	I1JOE	1,460	1	4	10

Check Logs were also received from DL3NO, G8CDW and ON4BX.

The **British Amateur Radio Teleprinter Group** will be on the air this year from the R.S.G.B. International Radio and Communications Exhibition to be held in London between 1st and 4th October inclusive. The call sign in use will be GB3RS and the frequency on or around 14.090 Mc.

Operation will be confined to Exhibition hours and in conjunction with s.s.b. transmissions from the R.S.G.B. stand on the h.f. bands. Although specific times of operation cannot be given, it is expected that RTTY will be heard from the Exhibition between 10.00 and 13.00 GMT, and again between 16.00 and 19.00 GMT. Special B.A.R.T. QSL cards will be issued to confirm RTTY contacts.

THE 9th INTERNATIONAL CONGRESS OF RAILWAYMEN RADIO AMATEURS

FEDERATION INTERNATIONALE DES RADIO AMATEURS CHEMINOTS

(International Federation of Railwaymen Radio Amateurs)

Letter from DJ3UN (translated by VK2AOU)

The world wide common professional activities of railwaymen brought it about that those who are also Radio Amateurs founded the F.I.R.A.C. This activity is supported by the various railway authorities in many countries, and especially in the larger cities railway Radio Amateur clubs were formed on railway land which operate club Amateur stations (like DL0DD in Hamburg, Germany).

The F.I.R.A.C. was founded in 1960 when French and Swiss Radio Amateurs met in Geneva. International congresses were held since 1962 to establish personal contacts and friendship between railwaymen, and the organisation was established. A constitution was worked out, the administration was organised, an annual call book printed, and a rapid-call-book prepared.

For the last three years two contests were held annually in April and November respectively. The F.I.R.A.C. award is being prepared. There are regular weekly radio contacts on all bands, and the number of participants is increasing all the time.

The following national groups belong now to F.I.R.A.C.: From DL, F, G, HB, I, LA, LX, OE, OH, ON, OZ, PA, SM and YU, as well as from the U.S.A. (Baltimore and Ohio/Chesapeake and Ohio Railroads Amateur Radio Club), VE, 5N2 and 6W8. Colleagues from the following countries have been invited to join: CT, EA, JA, PY, SV, TJ, VK, YO, ZL, ZS, 4S7 and others.

Many national F.I.R.A.C. groups have their own club stations (at the moment 18 in West Germany), where training of beginners in all fields of Amateur Radio is carried out like c.w., regulations, home construction of the rx, tx and other gear.

The next international congress will be held at the German alpine village of Grainau (resort place at the foot of Germany's highest mountain, 9,000 feet). The meeting place is "House Hammersbach". 200 members from 14 countries will participate.

There will be three congress meetings and several sight seeing trips. The call sign of the congress station will be DL0CF. It is being operated from 21st to 25th September, 1969, and from 29th September to 2nd October, 1969. The operating times (suitable for contacts with VK) are 0930 to 1100 GMT 14,345 Kc. and 14,200 Kc. A special QSL and postage stamp is being issued, as well as a special postcard. The official opening of the congress is on 25th September, 1969, 1 to 7 p.m.

Further information may be obtained by writing to H. Windelband, DJ3UN, 2 Hamburg, 63, Stuebelheide 170, West Germany. Phone 595-003 or 591-255, Ext. 306.

Those railwaymen Amateurs who happen to have their long service leave and are on the continent next September can be sure of a great time if they would attend this congress.

HAMADS

Minimum $1 for forty words. Extra words, 3 cents each.

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE.

Advertisements under this heading will be accepted only from Amateurs and S.w.l's. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at **P.O. 36, East Melbourne, Vic., 3002**, by **5th of the month** and **remittance must accompany** the advertisement.

FOR SALE: Collins Mechanical Filter, 2.1 Kc. bandwidth, 455 Kc., with matching Pye crystals, perfect order, $30 o.n.o. C. Jenkins, VK4QJ, P.O. Box 199, Roma, Qld., 4455.

FOR SALE: Collins S Line complete, consisting of 32S3 transmitter, 75S3C receiver, 62S1 vh.f. transmitter/receiver converter, 516F2 a.c. supply. These are current models and in top condition. The receiver, which will not be sold separately, is fitted with switchable Collins 600 cycle mechanical filter for v.h.f. DX work. These units were purchased new from Collins by advertiser. $2,150. Alec Swinton, VK2AAK, P.O. Box 1, Kulnura, N.S.W., 2251.

FOR SALE: Galaxy V. Transceiver with commercial power supply and VSWR bridge. CW monitor included in power supply. Mint condition, $425. Phone Melbourne 83-9355 evenings.

FOR SALE: Geloso G4/215 Ham Band only Receiver, 3 years old, in mint condition. Suit Ham or discriminating S.w.l. $125. Well built complete 2 mx a.m. Transmitter, $60. R. TV & H 1963 R-C Bridge, $10. VK3AXM, L. De Vries, 167 Lloyd St., Moe, Vic., 3825.

FOR SALE: Imported Parkes 432.3 U.h.f. Converter as used on recent moon bounce tests, low noise level. TIXMO 5 and TIXMO 7 transistors, in-built regulated supply, as new, $54. Alec Swinton, VK2AAK, P.O. Box 1, Kulnura, N.S.W., 2251.

FOR SALE: Megacycle Meter by Measurements Ltd., New Jersey (see A.R.R.L. Handbook ad.), Model 50 UHF Head, $100. Power supply for meter, $60. Alec Swinton, P.O. Box 1, Kulnura, N.S.W., 2251.

FOR SALE: Solid state power supply as used on Hallicrafter HA-2 2-metre transverter, 750v. at 150 mA., 250v. at 125 mA., and —60 volt. $80. Alec Swinton, P.O. Box 1, Kulnura, N.S.W., 2251.

FOR SALE: Table Top five-band a.m., c.w., f.m. commercial tx. 95 watts r.f. O/P all bands, in-built power supply. As new. Ideal for conversion to double sideband. See Adv. "A.R.," April '69. Inquiries VK3XD, ph. 439-9862. $125 o.n.o.

SELL: Channel Master H.D. Automatic Rotator, 240v., with cables and ball race thrust bearing, as new in carton, $50. Wanted: Vox Board, suit Galaxy Transceiver. D. J. Fisher, P.O. Box 53, Dapto, N.S.W., 2530. Phone Wollongong 61-2144.

SELL: National NCX-A Power Supply. Matches NCX-3 and NCX-5 Transceivers. Post Office Box 69, Kew, Vic., 3101.

SWAN 350, full 10 mx coverage, plus Swan-type 1,000 volt heavy duty a.c. supply; like new condition with original carton, $375. Pair SCR536F Walkie-Talkies, with xtals on 80 mx plus spare chassis, $25 with handbooks. VK2ASI, 6 Victoria St., Inverell, N.S.W., 2360.

SWAN 350 with a.c. power supply, 100 Kc. calibrator. $430, or offer. VK4KE, 106 Taylor St., Toowoomba, Qld., 4350.

VK3AOD is clearing out his shack and is offering the following for sale. R.C.A. AR88 Receiver, fitted with P/D for SSB reception, perfect order, spot on calibration, complete with matching speaker and instruction book; bargain at $150. Wilcox Gay VFO, 1 to 10 megs., beautiful job made for U.S. Forces to drive Command Transmitters; very stable, fitted in solid copper case, 807 output metered, complete with instruction book; best offer over $30. Astor Model T.V.1 3-inch CRO, very little used; time base 2 c/s. to 50 kc., with instruction book and circuit, $50. Palec Model TVM vac. tube voltmeter, complete with EHT probe, etc., very little used since new, lab. job; bargain, $50. National Model RS772 Stereo Tape Recorder, 3-speed 4 tracks, perfect order; this is the big daddy job incorporating all necessary refinements, cost over $400; bargain at $150. For any trial or inspection given on the above, Phone Warragul 22771: after hours or week-ends phone 21106. Home QTH: 67 Latrobe St., Warragul, Vic.

WANTED: Manual, circuits or any information on AMT150 Tx and its power supply. A. J. Greenham, VK4AG, 21 The Crescent, Kallangur, Qld., 4503.

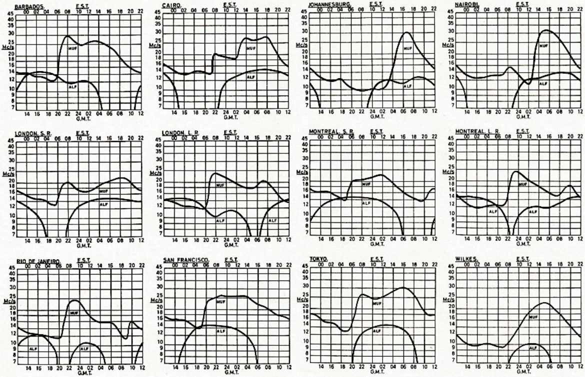
WANTED: Test Equipment in good condition. Sweep and Marker Generator or Sweep Generator and Marker Adder Unit. Also TV Pattern Generator. Full particulars to Col. Harvey, VK1AU, 16 Leane St., Hughes, A.C.T.

WANTED: 12v. d.c. Supply for Swan; also Ant. Mount for mobile use. Sell: Geloso VFO, pair 807s mod., 813 p.a., including power supply. Please write to VK3ATF, Grant Street, Point Lonsdale, Vic.

WANTED TO BUY: Any Coil Boxes for AR7 Receiver. Also any Ceramic American Loctal Sockets or Sockets (2) to suit 4CX250. Ring S. Gregory, Melb. (9-5) 379-3132.

PREDICTION CHARTS FOR JULY 1969

(Prediction Charts by courtesy of Ionospheric Prediction Service)



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SPECIFICATIONS:

FREQUENCY RANGE: Band A—550-1,600 Kcs.; Band B—1.6-4.8 Mcs.; Band C—4.8-14.5 Mcs.; Band D—10.5-30 Mcs.

BANDSPREAD: Calibrated Electrical Bandspread. 80 and 40 metres—5 Kcs. per division. 20 and 15 metres—20 Kcs. per division. 10 metres—50 Kcs. per division.

ANTENNA INPUT: 50-400 ohms impedance.

AUDIO POWER OUTPUT: 1.5 watts.

SENSITIVITY: 2uV for 10 dB S/N Ratio (at 10 Mcs.).

SELECTIVITY: ±5 Kcs. at —60 dB (±1.3 Kcs. at —6 dB). When using the Mechanical Filter.

BFO FREQUENCY: 455 Kcs. ±2.5 Kcs.

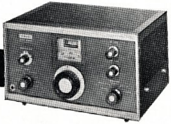
SPEAKER OUTPUT: 4 or 8 ohms.

HEADPHONE OUTPUT: Low impedance.

TUBE COMPLEMENT: V1—6BA6 RF Amplifier; V2—6BE6 Mixer; V3—6AQ8 HF Oscillator; V4—6BA6 1st IF Amplifier; V5—6BA6 2nd IF Amplifier; V6—6BE6 Product Detector; V7a—6AQ8 Beat Frequency Oscillator; V7b—6AQ8 1st AF Amplifier; V8—6AQ5 Audio Output; IN60—AF Detector; IN60, SW-05s—AVC; SW-05s—ANL; SW-05s x 2—Rectifiers. **$175.00 FOR/FOA SYDNEY**

MODEL **JR-500SE**

AMATEUR BAND COMMUNICATIONS RECEIVER



SPECIFICATIONS:

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SPURIOUS RESPONSES: Image rejection more than 40 dB IF rejection more than 40 dB.

AUDIO OUTPUT: 1 watt maximum.

TUBE COMPLEMENT: V1—6BZ6 RF amplifier; V2—6BL8 Crystal controlled 1st mixer; V3—6BE6 2nd mixer; V4—6BA6 IF amplifier; V5—6BA6 IF amplifier; V6—6AQ8 BFO and product detector; V7—6BM8 Audio amplifier.

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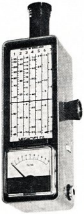

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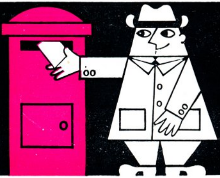

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